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CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT
CONCEPTUAL DESIGN AND DRAFT EIS/EIR

Draft Environmental Impact Statement/Draft Environmental Impact Report

FEDERAL TRANSIT ADMINISTRATION – U.S. DOT
PENINSULA CORRIDOR JOINT POWERS BOARD

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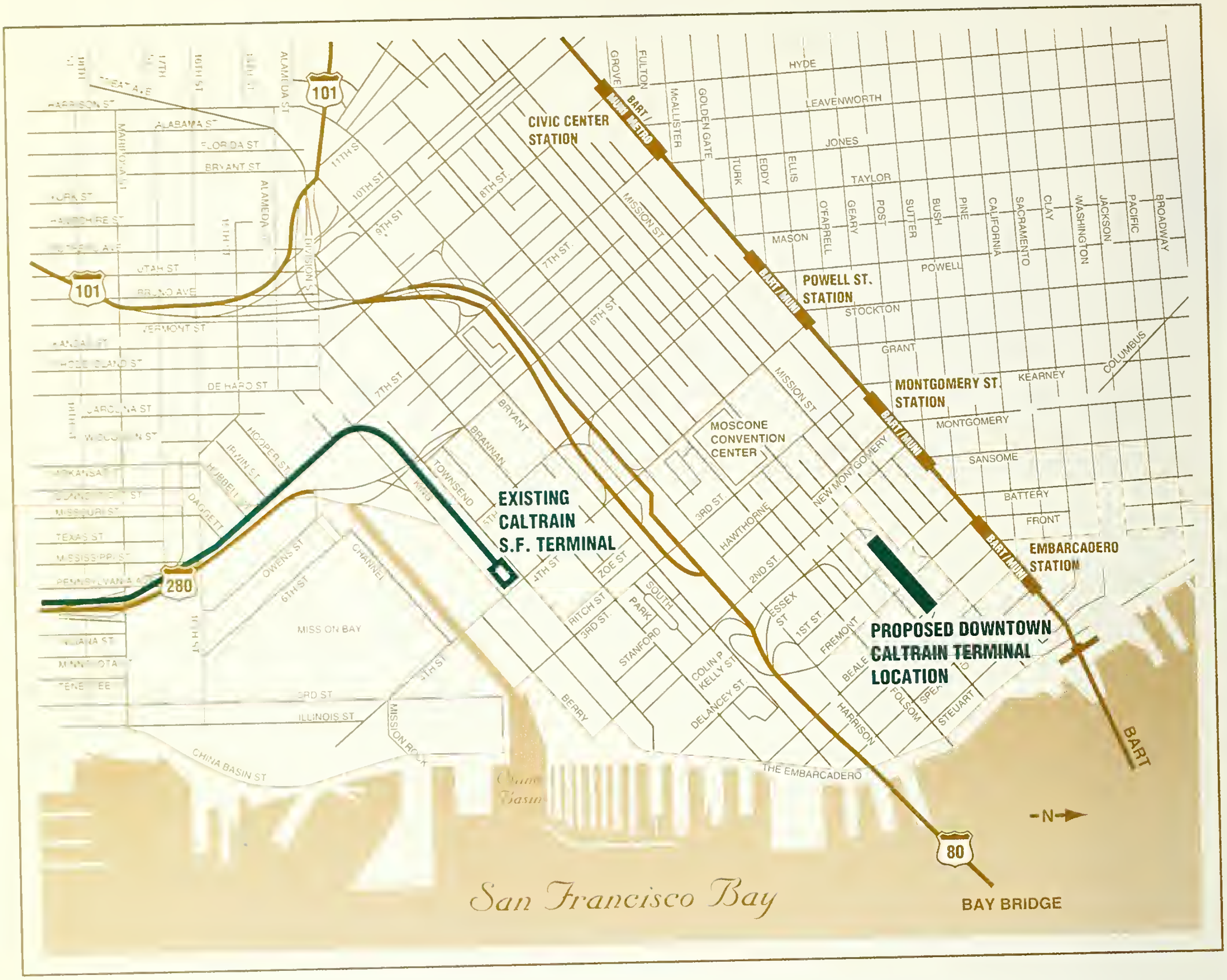
101
CIVIC CENTER STATION
BART / MUNI METRO
POWELL ST. STATION
MONTGOMERY ST. STATION
EMBARCADERO STATION
BART / MUNI
MOSCONE CONVENTION CENTER
EXISTING CALTRAIN S.F. TERMINAL
PROPOSED DOWNTOWN CALTRAIN TERMINAL LOCATION
280
80
BAY BRIDGE
BART
-N-
San Francisco Bay
THE EMBARCADERO
MISSION BAY
CHINA BASIN ST
ILLINOIS ST
3RD ST
HYDE
LEAVENWORTH
JONES
TAYLOR
MASON
POWELL
STOCKTON
GRANT
KEARNEY
MONTGOMERY
SANSOME
BATTERY
FRONT
COLUMBUS
GROVE
FULTON
McALLISTER
GOLDEN GATE
TURK
EDDY
ELLIS
O'FARRELL
GEARY
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NEW MONTGOMERY
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2ND ST
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1ST ST
FREMONT
BEALE
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HARRISON
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COLIN P. KELLY ST
DELANCEY ST
STANFORD
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TENNESSEE
MINNESOTA
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HOOPER ST
IRWIN ST
HUBBELL
DAGGETT
OWENS ST
6TH ST
16TH ST
15TH ST
17TH ST
18TH ST
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MISSION ROCK
China Basin

Report Prepared by:

ICF Kaiser Engineers/DeLeuw Cather Team

in association with

Dames & Moore, AGS, and MIG

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CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

in the City and County of San Francisco, San Mateo and Santa Clara Counties

DRAFT ENVIRONMENTAL IMPACT STATEMENT/ DRAFT ENVIRONMENTAL IMPACT REPORT AND DRAFT SECTION 4(f) EVALUATION

Pursuant to
National Environmental Policy Act (42 USC §4332) 49 USC Chapter 53, 49 USC §303, 16 USC §470, 23 CFR Part 771, 23 CFR Part 450, Executive Order 12898; and California Environmental Quality Act, PRC 21000 *et seq.*; and the State of California CEQA Guidelines, California Administrative Code, 15000 *et seq.*

by the

US DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and the

PENINSULA CORRIDOR JOINT POWERS BOARD

For JPB: Gerald T. Haugh 3/5/97
Gerald T. Haugh Date
Executive Director
Peninsula Corridor Joint Powers Board

For FTA: Leslie Rogers 3/5/97
Leslie T. Rogers Date
Region IX Administrator
Federal Transit Administration

The following persons may be contacted for additional information concerning this document:

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Mr. Bob Hom
Director, Office of Program Development
US Department of Transportation
Federal Transit Administration, Region IX
201 Mission Street, Suite 2210
San Francisco, CA 94105
(415) 744-3133

ABSTRACT: The Peninsula Corridor Joint Powers Board proposes to extend the Peninsula Commute Service (CalTrain) from its current terminus at Fourth and Townsend Streets in the City of San Francisco to the site of the present Transbay Terminal. The purpose of this project is to improve CalTrain commute service by providing direct access to downtown San Francisco. Increases in CalTrain and other transit ridership, reductions in automobile congestion on parallel routes and improvements in regional air quality are expected to result. Impacts include the loss of the Transbay Terminal and terminal loop ramp, resulting in adverse effects on the Bay Bridge, a National Register of Historic Places-eligible resource; business displacements, and disruption during construction. Proposed mitigation measures include public information and management practices during construction, historic recordation, bus terminal replacement and expansion of CalTrain station parking.

Comments on this Draft EIS are due by May 12, 1997 and should be sent to Ms. Marie Pang at the address given above.

REF 388.472 C138d

Caltrain San Francisco
downtown extension
1997.

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415-744-3133
415-744-2728 (fax)

Ref: Draft Environmental Impact Statement
CalTrain San Francisco Downtown Extension

Dear Reader:

The enclosed Draft Environmental Impact Statement (DEIS) evaluates alternative means of extending the Peninsula Commute Service (CalTrain) from its present terminus at Fourth and Townsend Streets into downtown San Francisco. It was prepared by the Peninsula Corridor Joint Powers Board and the Federal Transit Administration of the U.S. Department of Transportation.

The sponsoring agencies seek your comments on any and all aspects of the alternatives under consideration. In particular, the financial planning for the proposed project, which appears in Chapter 12, is still under development and depends on a number of federal, state and local decisions and actions. The sponsoring agencies are interested in the views of the affected public on the funding plan contained in this document.

You may provide written comments on the project to:

Ms. Marie L. Pang
Environmental Manager
Peninsula Corridor Joint Powers Board
1250 San Carlos Avenue
P.O. Box 3006
San Carlos, CA 94070-1306

by the date indicated at the bottom of the title page (the first inside page) of the DEIS. There will also be a public hearing on the proposed project at a time and location to be announced in major newspapers, or you may call the project office at (415) 508-6338 for information on the hearing.

Sincerely,

Leslie Rogers

Leslie T. Rogers
Regional Administrator

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SUMMARY

This Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) has been prepared pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) to analyze the potential environmental impacts of the proposed CalTrain San Francisco Downtown Extension to the Transbay Terminal Site.

The purpose of and need for the project are summarized below, along with the development and selection of project alternatives for analysis. The two project alternatives evaluated in this DEIS/DEIR are also described. Potential impacts in the future analysis year of 2010 are summarized, along with mitigation measures proposed as part of the project, and unresolved issues and areas of controversy.

S-1 PROJECT LOCATION

The Peninsula Corridor Joint Powers Board (JPB) currently operates commuter rail service (CalTrain) from San Francisco to Gilroy, and serves communities within three northern California counties: San Francisco, San Mateo, and Santa Clara.

The CalTrain Extension to the Transbay Terminal Site would extend the existing CalTrain commuter rail service from its present northern terminus at Fourth and Townsend Streets in San Francisco to a proposed terminal at the site of the present Transbay Terminal in downtown San Francisco, a distance of approximately 1.3 miles. The rail extension would be entirely within the City and County of San Francisco. Project construction would occur in the South of Market area, between 16th Street on the south, and Market Street on the north. After construction, project features in San Francisco would be mostly underground, as described further below.

Project features in San Mateo and Santa Clara Counties would be limited to possible electrification facilities, if full system electrification is implemented for the existing CalTrain route, and parking lot expansions with related access improvements at suburban stations proposed as mitigation for the increased demand associated with increased CalTrain ridership from the downtown extension. (See further explanation in Section S-3, below, and in Chapters 2 and 7.)

S-2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the CalTrain Downtown Extension Project is to:

- Improve CalTrain service by providing direct access to downtown San Francisco;
- Enhance connectivity between CalTrain and other major transit systems;

- Accommodate projected growth in future travel demand in the San Jose - San Francisco corridor;
- Enable direct access to downtown San Francisco for possible future intercity and/or high speed rail service;
- Reduce traffic congestion on US Highway 101 and I-280 between San Jose and San Francisco and other routes owing to reduction in private auto usage;
- Reduce vehicle hours of delay on major freeways in the Peninsula corridor;
- Improve regional air quality by reducing auto emissions;
- Support local economic and land use development goals, and
- Enhance accessibility to employment, retail and entertainment opportunities

Objectives of the CalTrain Extension Project relate to one central issue: getting the train as close as possible to where most riders want to go. Weekday CalTrain ridership in February 1996 is estimated at 22,200 passengers, and over half of these riders pass through the current CalTrain terminus at Fourth and Townsend streets.[1] Half (some 5,500) of the approximately 11,000 morning riders exit at the terminus station; and, correspondingly, over half of the riders board the train at the terminus in the evening. Since February, ridership has increased to nearly 24,000.[2]

The distance between the current CalTrain terminus and most downtown San Francisco job destinations is beyond walking distance for the majority of train riders and requires a bus transfer to complete the journey. The proposed project is needed to allow Peninsula riders to reach downtown San Francisco without transferring to other modes of travel, thereby improving travel times and reducing delay costs.

Relocating CalTrain's San Francisco terminus to the Transbay Terminal area is expected to result in a seven percent reduction in the number of person hours of vehicle travel.[3] Morning peak hour delay is expected to be reduced by 20 percent. Implementation of the CalTrain Extension would result in daily travel time savings of 4,400 person hours, which includes 2,900 person hours saved for CalTrain riders and 1,500 person hours for roadway travelers in the corridor. Using FTA procedures, this represents an approximate $12 million per year savings (4,400 hours/day X $11.26/hour X 250 work days/year).

As described in Chapter 1, the project is also needed in order to expand CalTrain ridership, to enable convenient transfers to the San Francisco Municipal Railway (Muni), Bay Area Rapid Transit (BART) and other transit systems, and to meet current and future transportation demand. Because substantial capacity improvements to U.S. 101 and I-280 cannot be assumed to address long-term travel demands in the corridor, CalTrain provides a vital transportation alternative to costly highway capacity expansion. Transportation modeling results show that the CalTrain downtown extension substantially reduces vehicle hours of delay in the Peninsula corridor. Improving mass transit alternatives for Bay Area commuters can address current and projected future roadway congestion, reduce future parking demand in downtown San Francisco, and improve regional air quality. Extending CalTrain to downtown San Francisco also provides the opportunity to create a regional intermodal transit hub, and to coordinate commercial development in the terminal vicinity.

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[1] CalTrain February/March 1996 Ridership Survey.

[2] *CalTrain Performance Report*, 1996

[3] August 27, 1996 memo from Korve Engineering to ICF Kaiser Engineers.

S-3 ALTERNATIVES EVALUATED IN THIS DEIS/DEIR

S-3.1 Development & Selection of Alternatives

A number of prior studies have evaluated options for locating a CalTrain station in downtown San Francisco, and in 1989, an Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report (AA/DEIS/DEIR) was completed, but was not released due to lack of funding commitments for the local share of project costs.

In late 1993, the JPB joined with the Metropolitan Transportation Commission (MTC) to identify ways to reduce costs and review federal, state, and local funding sources to finance a less costly project. This study evaluated nine project alternatives, two of which emerged as the most viable. In 1994, the JPB passed Resolution No. 1994-8 identifying electrified service extended to a terminal at Market and Beale Streets as the Locally Preferred Alternative (LPA), and designating electrified service extended to the Transbay Terminal as an alternative to be carried forward for conceptual engineering and environmental analysis.

Conceptual engineering and environmental studies focussed on the two terminal site alternatives and a variety of horizontal and vertical alignment extension options, construction techniques, terminal configurations, propulsion options, and alternate storage yard locations. The alternative screening process is described in the JPB's *Design Options Screening Report* (September, 1995). Following release of the Design Options Screening Report, the JPB and City of San Francisco passed resolutions eliminating the original LPA (Market/Beale Alternative) as infrasible and succeeded in narrowing the range of practicable alternatives to two: the No-Build Alternative, and the CalTrain Extension to the Transbay Terminal Site Alternative. These alternatives, along with alternatives considered and withdrawn from further study, are described further below and in Chapter 2.

S-3.2 The No-Build Alternative

Consistent with requirements of NEPA and CEQA, a No-Build Alternative is analyzed in this DEIS/DEIR to provide a baseline for comparison with the proposed project. The No-Build Alternative would not construct any project features, but assumes implementation of future highway and transit improvements that are currently planned and programmed for funding.

For the transit network, the No-Build Alternative assumes that CalTrain service would remain at its current 60 trains per day level or increase to 86 daily trains, and that the following capital improvements would be implemented:

- Improvements to the existing CalTrain Fourth and Townsend Street terminal designed to facilitate transfers to the Muni Metro King Street extension,
- Rehabilitation of CalTrain track and stations,
- Purchase of three new locomotives and 17 new passenger cars to provide increased service and improved disabled access,
- Replacement of the existing fleet of 20 diesel locomotives between the years 2005 and 2010,
- Improvements to key stations designed to improve access for the disabled,
- Construction of a maintenance and storage facility in Santa Clara County,
- Grade crossing improvements in San Mateo County, and
- Relocation of the San Mateo, Hayward Park, and Castro/San Antonio Road Stations.

Other planned, ongoing, or constructed projects assumed in the No-Build Alternative include capital improvements and service changes affecting Muni, BART, and SamTrans. Specifically, the No-Build Alternative assumes completion of the Muni Metro Turnback Project, Muni Metro Extension to Fourth and King Streets adjacent to the current CalTrain terminal, Muni F-Line Project, Muni Bus Layover Facility Expansion, and the BART extension to the San Francisco International Airport (SFO), with stations in South San Francisco, San Bruno, and Millbrae. A BART/CalTrain intermodal station is planned at Millbrae Avenue to facilitate passenger transfers between CalTrain and BART. Following implementation of the F-line and light rail service on the Muni Metro extension, Muni plans to eliminate duplicate bus service on the 32-Embarcadero and restructure the routes for the 80X, 81X and 82X. SamTrans bus service changes are anticipated to occur with implementation of the BART extension to SFO and Millbrae.

The No-Build Alternative also assumes completion of street and roadway improvements in San Francisco, including improvements along the San Francisco waterfront from Fisherman's Wharf to King and Sixth Streets, and construction of new on- and off-ramps linking I-280 and King Street at Fifth Street. Other planned improvements assumed in the No-Build Alternative include modification of the Fremont Street off-ramp from the Bay Bridge/I-80 westbound to provide direct access to Folsom Street, widening of the existing Fourth Street off-ramp from I-80 eastbound, and implementation of a package of surface street physical and operational improvements in downtown San Francisco planned as part of the City's Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure.

S-3.3 The CalTrain Extension to the Transbay Terminal Site Alternative

The CalTrain Extension to the Transbay Terminal Site Alternative consists of an extension of CalTrain from the present San Francisco terminus at Fourth and Townsend Streets to an underground terminal on the site of the present Transbay Terminal at First and Mission Streets. The extension would consist of two tracks branching to six tracks within a new underground terminal, and is described in three segments: Townsend Street Segment, Mined Tunnel Segment, and Folsom Street to Transbay Terminal Segment. The following options are under consideration:

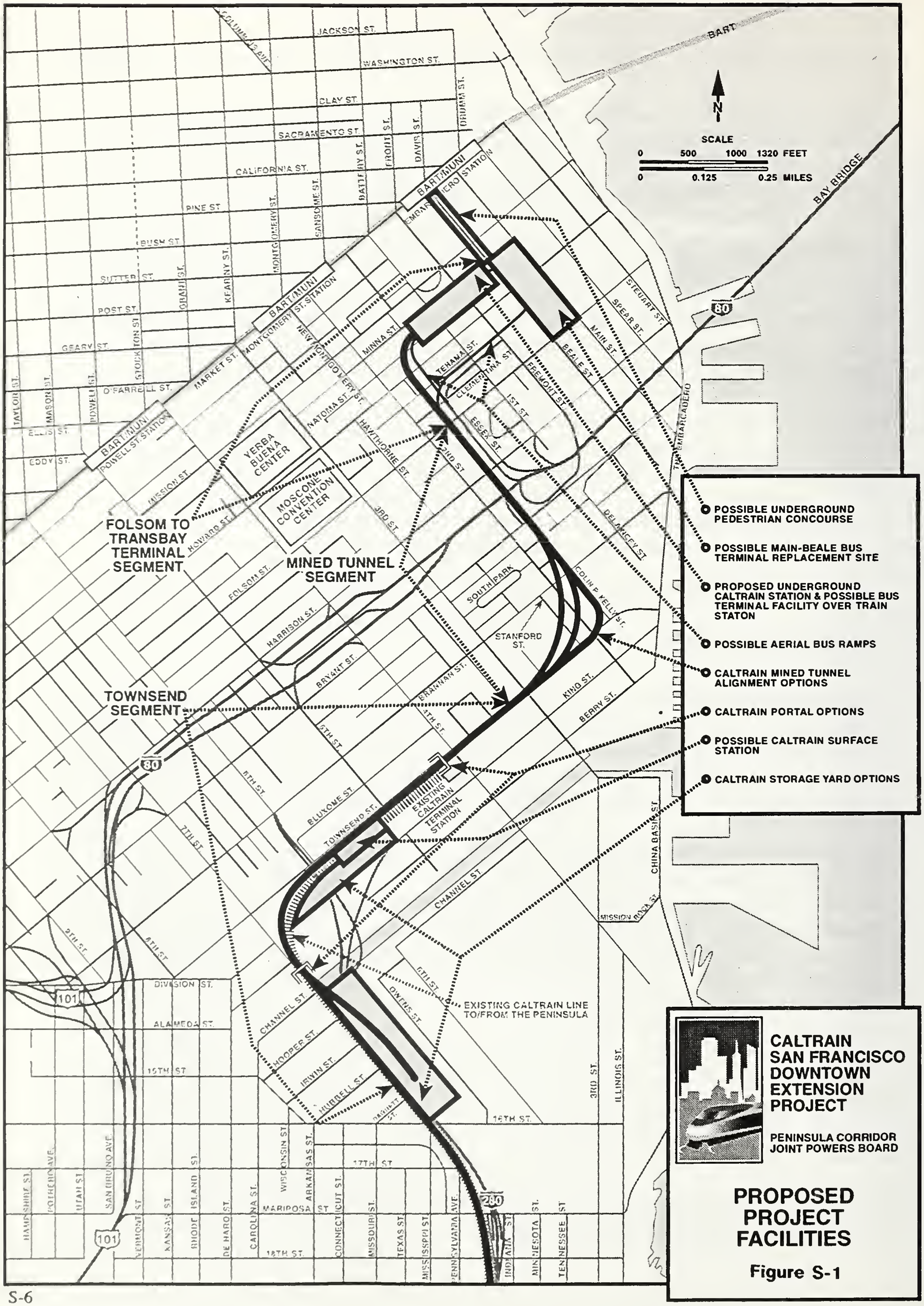
- Three alignment options along Townsend Street (Townsend Street Segment),
- Three alignment options for tunneling under Rincon Hill as the extension passes from Townsend Street to Folsom Street (Mined Tunnel Segment),
- One alignment option for the Folsom to Transbay Terminal Segment,
- Three propulsion options for powering the trains, and
- Two options for location of a new CalTrain storage yard.

Segments and options are shown in Figure S-1, summarized below, and described in Chapter 2.

Townsend Street Segment

There are three alignment options for the segment under the I-280 Freeway from 16th Street to Townsend Street and along Townsend Street between Third and Seventh Streets. The Townsend-Center Alignment Option would travel on the surface from 16th Street, curve east as it approaches Townsend Street, cross two newly constructed eastbound traffic lanes of Townsend Street, and remain on the surface in the center of a reconstructed Townsend Street to Fifth Street.

The second Townsend Street option, the Townsend-South Side Alignment Option, would place the CalTrain Extension along the southern side of Townsend Street, with the two CalTrain tracks entirely within the Catellus-owned Mission Bay area (on property for which the JPB has a permanent easement). Under both the Townsend-Center Option and the Townsend-South Option, a new surface station would be built between Fifth and Sixth Streets to serve Mission Bay and the proposed new ballpark. Beyond Fifth Street, the alignment would descend into a tunnel portal located just west of Fourth Street.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EDDY ST.
COLUMBUS AVE.
DRUMM ST.
DAVIS ST.
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SANSOME ST.
MONTGOMERY ST.
KEARNY ST.
GRANT ST.
STOCKTON ST.
POWELL ST.
MASON ST.
TAYLOR ST.
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
MARKET ST.
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
TOWNSEND ST.
BLUXOME ST.
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HAWTHORNE ST.
TEHAMA ST.
CLEMENTINA ST.
1ST ST.
ESSEX ST.
2ND ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
THE EMBARCADERO
DELANCEY ST.
COLIN P. KELLY ST.
SOUTH PARK
STANFORD ST.
KING ST.
BERRY ST.
CHANNEL ST.
CHINA BASIN ST.
MISSION ROCK ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
FOLSOM TO TRANSBAY TERMINAL SEGMENT
MINED TUNNEL SEGMENT
TOWNSEND SEGMENT
EXISTING CALTRAIN TERMINAL STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
POSSIBLE UNDERGROUND PEDESTRIAN CONCOURSE
POSSIBLE MAIN-BEALE BUS TERMINAL REPLACEMENT SITE
PROPOSED UNDERGROUND CALTRAIN STATION & POSSIBLE BUS TERMINAL FACILITY OVER TRAIN STATON
POSSIBLE AERIAL BUS RAMPS
CALTRAIN MINED TUNNEL ALIGNMENT OPTIONS
CALTRAIN PORTAL OPTIONS
POSSIBLE CALTRAIN SURFACE STATION
CALTRAIN STORAGE YARD OPTIONS
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
MARIPOSA ST.
101
280
OWENS ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.
3RD ST.
ILLINOIS ST.
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

PROPOSED PROJECT FACILITIES

Figure S-1

The third Townsend Street option, the Townsend-South/Subway Option, would include the longest underground segment. The alignment would run parallel to and south of existing Townsend Street from a proposed portal at Seventh and Berry Streets. A cut-and-cover tunnel would be constructed northward along the east side of Seventh Street, and would then curve to the south side of Townsend Street, remaining within Catellus-owned Mission Bay area (on property for which the JPB has a permanent easement) to just west of Fourth Street. The tunnel alignment would then shift northward under Townsend Street. This alignment option does not include a Mission Bay/Ballpark Station because of the high cost (estimated at approximately $40 million) to provide an underground station.

Principal features of the three possible Townsend Street alignment options are compared below, in Table S-1.

Table S-1
Comparison of Townsend Street Alignment Options

Options	Townsend-Center	Townsend-South Side	Townsend-South/ Subway
Alignment	Center of Widened Townsend Street	South side of Townsend Street	Subway South side of Townsend Street
Portal Location	West of Fourth Street	West of Fourth Street	Seventh & Berry Streets
Mission Bay/ Ballpark Station	Yes	Yes	No (would add an estimated $40 million)
Number of Tracks at Mission Bay/ Ballpark Station	2	3	No Station
Estimated Cost	- $1 million	Base Case*	+ $112 million

* See Table S-5 and explanatory text on page S-11.

Source: ICF Kaiser Engineers, September, 1996

Mined Tunnel Segment

A mined tunnel would begin on Townsend Street just west of Third Street and continue east and north under Rincon Hill to just west of Essex Street and north of Folsom Street. Unlike at-grade or cut-and-cover construction, mined tunneling primarily involves work underground, and is proposed to greatly reduce construction impacts on the neighborhood and historic structures in the area. Three mined tunnel alignment options are under consideration as shown in Figure S-1.

The Short-Radius/Long Mined Tunnel Option would descend as it proceeds under Townsend Street from Third Street to Second Street. At Second Street, this tunnel would turn northward, passing under Second Street before entering the Colin P. Kelly Street right-of-way. North of Brannan Street, the mined tunnel would continue under the South Beach Billiards building, Bryant Street, the I-80 structure and ramps, and to the west of the Essex Street right-of-way. The mined tunnel would end just north of the Essex and Folsom Streets intersection.

The Medium-Radius/Medium Mined Tunnel Option would descend as it proceeds under Townsend Street between Third Street and Second Street and curve northward at Stanford Street. The tunnel would pass under the San Francisco Fire Department's building at 698 Second Street before entering the Colin P. Kelly Street right-of-way just south of Brannan Street. North of Brannan Street, the medium- and short-radius mined tunnels would follow the same alignment through Rincon Hill to Essex and Folsom Streets.

The Long-Radius/Short Mined Tunnel Option would begin curving northward at about Clarence Place just east of Third Street. The long-radius/short mined tunnel would rejoin the alignment of the short- and medium-radius tunnels at Bryant Street and continue under the I-80 structure and ramps to Essex and Folsom Streets.

Table S-2 provides basic characteristics of the mined tunnel options.

Table S-2
Mined Tunnel Options

Options	Short-Radius/Long Mined Tunnel	Medium-Radius/Medium Mined Tunnel	Long-Radius/Short Mined Tunnel
Distance	2,575 feet	2,400 feet	2,215 feet
Maximum Train Speed	30 mph	20 mph	40 mph
Number of Buildings Passed Under	6	9	16
Estimated Cost	Base Case	- $ 4 million	- $ 6 million

Folsom to the Transbay Terminal Segment

The transition from mined tunnel back to cut-and-cover subway would occur just north of Folsom Street at Essex Street. This cut-and-cover construction would complete the remaining segment of the proposed CalTrain Extension Alternative underground to the Transbay Terminal site, and would follow the right-of-way for the existing outbound bus access ramp that leads from the existing Transbay Terminal to the Bay Bridge. The alignment would turn 90 degrees eastward just after crossing Howard Street, and branch from two to six tracks as it enters the Transbay Terminal site.

The proposed new CalTrain terminal would encompass the footprint of the present Transbay Terminal building plus portions of Minna and Natoma Streets, which border the Transbay Terminal on the north and south. Six tracks and three center platforms would serve CalTrain, with at least two tracks available for future intercity and/or high speed rail service. Each platform would have elevator, escalator and stair access to street level. The underground terminal could incorporate a pedestrian concourse with moving sidewalks under Beale Street from Market Street to Natoma Street to connect the new CalTrain terminal with BART and Muni Metro at the Embarcadero Station. Muni/SamTrans bus services are proposed to be located: (1) on the surface above the eastern end of the future CalTrain terminal on the block between Fremont and Beale Streets or (2) along a bus mall on Beale Street south of Mission Street with a bus turnaround facility east of Beale Street between Folsom and Howard streets. The CalTrain terminal building's foundations and structural columns would be designed and positioned between the tracks and on the platforms to support possible future development(s) above the CalTrain terminal.

CalTrain Storage Yard Options

A new storage yard is proposed in San Francisco to accommodate layovers and storage for CalTrain trains not needed during the off-peak periods. Two alternative CalTrain storage yard locations are proposed: 1) South of Townsend Street between Fifth and Seventh Streets, and 2) partially under and parallel to the I-280 freeway viaduct west of Owens Street between Channel and Sixteenth Streets in Mission Bay. Table S-3 summarizes characteristics of these yard options.

Table S-3
Storage Yard Options

Options	16th and Owens Streets	7th and Townsend Streets
Capital Cost	Base Case	- $ 1 million
Right-of-way Availability	Purchase from Catellus	JPB holds permanent easement for railroad use
Land Use Considerations	Designated light industrial in Mission Bay Plan	Designated light industrial in Mission Bay Plan
Environmental	Between I-280 freeway and planned housing	Adjacent to and under I-280 freeway ramps; has been rail yard since late 1800s
CalTrain Operational Impacts	Longer deadhead and constrained layout, yielding slightly higher operating costs	Shorter deadhead and double-ended tracks, yielding lower operating costs
Muni/Metro East LRV Maintenance Facility Impacts	Requires re-alignment of planned access tracks, yard layout and possible purchase of additional land for Muni	No impacts

Locomotive Propulsion Options

Three locomotive propulsion options are being considered for the CalTrain Extension: 1) dual-mode operation using diesel/electric locomotives with 25 KV AC electric trailer units, 2) dual-mode operation using new 1,500-Volt DC diesel/electric locomotives, and 3) full system electrification using new 25 KV AC locomotives. For the dual-mode operation with electric trailer propulsion option, diesel locomotives similar to those presently used would power CalTrain from Gilroy to approximately 22nd Street in San Francisco. The propulsion system would then convert to electric mode without stopping prior to entering the underground alignment at the 7th Street or the Fourth and Townsend Street portal. An electric power converter unit, coupled to the diesel locomotive, would provide power for underground operation into the downtown terminal.

Under the dual-mode locomotive option, new locomotives that contain both diesel and electric power capability in one unit would replace the existing diesel fleet. Diesel engines would provide power for operation over the CalTrain system to approximately 22nd Street in San Francisco, and electric power would be used on the remaining 3.2 miles into the underground CalTrain terminal.

The full system electrification option envisions electrification of the entire 78-mile CalTrain alignment from Gilroy to the new downtown terminal, as well as electrification of the planned new maintenance and storage facility in San Jose or Santa Clara, and the proposed train storage yard in San Francisco. Table S-4 provides basic characteristics of the propulsion options.

Table S-4
Propulsion Options

Options	Dual-mode, New Diesel/electric Locomotives	Dual-mode with Electric Trailer Units	Full System Electrification
Electrification Type	1,500 V DC	25 KV AC	25 KV AC
Length	San Francisco Terminal to 22nd Street	San Francisco Terminal to 22nd Street	San Francisco Terminal to Gilroy
Capital Cost (millions of 1995 dollars)			
❐ Electric System	$ 17	$ 13	$ 150
❐ Locomotive/ Power Trailers	$ 118	$ 201	$ 129
Total Capital Costs	$ 135	$ 214	$ 279
Annual Operating Costs (millions of 1995 dollars)			
❐ 60 Daily Trains	$ 55.67	$ 57.58	$ 55.62
❐ 86 Daily Trains	$ 68.60	$ 70.99	$ 67.69

Project Costs

Table S-5 presents a summary of capital cost estimates for the CalTrain Extension to the Transbay Terminal Site Alternative. Cost estimates vary depending on alignment options, locomotive propulsion options, fleet vehicle requirements, and right-of-way costs. Estimates are provided for the "base case," which includes the Townsend-South Side Alignment, the short-radius/long mined tunnel, the Sixteenth and Owens Street yard, and the new dual-mode DC locomotive propulsion option. Total capital cost for this base case CalTrain Extension Alternative is estimated to be approximately $656.2 million in 1995 dollars.

Table S-5
Estimated Capital Costs - CalTrain Downtown Extension
Base Case Cost Estimates -- (Millions of July 1995 Dollars)

Cost Category	Amount [1]
Construction/Procurement	
Right-of-Way for Extension	$ 9.2
Townsend Street Segment (3,935 feet)	39.3
Mined Tunnel Segment (3,900 feet)	86.5
Folsom-Transbay Terminal Segment (990 feet)	39.9
6-Track Underground Terminal (1,035 feet)	85.2
Traction Power, Signaling & Communications	19.9
New Dual Mode Locomotives (23)	101.2
Additional Gallery Passenger Cars (15)	27.0
San Francisco Satellite Storage Yard	9.9
Subtotal Construction/Procurement	418.1
Engineering and Construction Management	75.0
Contingency	87.6
Project Reserve	40.0
Subtotal - San Francisco Downtown Extension Costs	620.7
Park and Ride Lot Expansion at Peninsula Stations [2]	35.5
Total	$656.2

[1] Does not include replacement costs for the Transbay Bus Terminal; Includes full cost of new dual mode locomotives only $24.2 million of which is directly due to the Downtown Extension Project; Includes Townsend-South Side Option; short-radius/long mined tunnel; 16th and Owens Street yard, and dual-mode DC locomotive propulsion.

[2] See Chapter 7 of DEIS/DEIR.

Source: ICF Kaiser Engineers, August 29, 1996.

Capital costs for the longer subway through Mission Bay (Townsend-South/Subway) would be $112 million more (1995 dollars) than the base case. Costs for diesel locomotives with electric power trailers or for full-system electrification would also be greater than the base case by $79 million and $144 million, respectively. Costs would be less than the base case for the medium-radius/medium mined tunnel and the long-radius/short mined tunnel by $4 million and $5 million, respectively. The Townsend at Seventh Street storage yard is estimated to be $1 million less than the storage yard at 16th and Owens assumed in the base case.

S-3.4 Alternatives and Options Considered and Withdrawn

Multiple alternatives and suboptions were considered for this study and subsequently withdrawn from further consideration based on engineering feasibility, public input, potential environmental impacts, operational constraints, or other criteria. These alternatives are listed below, and are described in detail in Chapter 2, along with the reasons for their withdrawal.

- CalTrain Extension to Market and Beale Streets (multiple alignment options, construction techniques, and terminal station configurations).
- King Street alignment options (using King Street instead of Townsend Street for the first segment of the CalTrain Extension, with alternative portal locations.
- Brannan Street alignment options (using Brannan Street instead of Townsend Street).
- CalTrain aerial terminal at the Transbay Terminal site.
- Propulsion options using clean diesel or liquefied natural gas fuels.
- CalTrain storage yard located in Brisbane.

S-4 SUMMARY OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

S-4.1 No-Build Alternative

The No-Build Alternative would not construct any project features, and would thus have no environmental or socioeconomic impacts. The No-Build Alternative would perpetuate existing and projected future travel delays and other effects associated with the existing CalTrain terminal at Fourth and Townsend Streets. Also, under the No-Build Alternative, the Transbay Terminal and associated ramps would ultimately require replacement or retrofit to ensure seismic safety and to meet current building codes and ADA requirements.

S-4.2 CalTrain Extension Alternative

This DEIS/DEIR identifies two main impacts of the CalTrain Extension Alternative: demolition of the existing Transbay Terminal and the terminal loop ramp due to construction of the underground CalTrain terminal, and increased parking demand at certain existing CalTrain stations on the Peninsula. Proposed mitigation options for both effects are analyzed in detail in Chapters 6 and 7, and are summarized below.

Mitigation Options to Replace the Existing Transbay Terminal

Four design options are under consideration for the replacement bus facilities proposed to mitigate the impacts of demolishing the existing Transbay Terminal. The four options are: (1) replace the existing bus terminal with a new bus terminal located between Main and Beale Streets south of the Pacific Gateway Building (201 Mission) nearly to Folsom Street; (2) construct a new bus terminal above the underground CalTrain station at the existing Transbay Terminal site; (3) replace the existing facility with a surface bus terminal between Main and Beale Streets south of the Pacific Gateway Building nearly to Folsom Street, and (4) replace the existing facility with a surface bus terminal on the site of the current Transbay Terminal. Each option incorporates alternative proposals to address the various transit service and related functions that need to be accommodated by the replacement facilities.

In all four cases, CalTrain would be located underground at the site of the existing Transbay Terminal. An underground walkway could be constructed to link the underground CalTrain terminal to the BART/Muni Metro Embarcadero Station; but this is considered an optional feature. A summary of features for each of the options is provided in Table S-6. The four options are described in the following sections.

Option A - New Bus Terminal Building at Main-Beale Site

Option A proposes a new three-level bus terminal on a site bounded by Beale and Main Streets and the southern perimeter of the Pacific Gateway building (201 Mission), south nearly to Folsom Street. New exclusive aerial ramps adjacent to the Fremont Street auto ramp would provide grade-separated bus access between the Bay Bridge and the second and third levels of the terminal. These exclusive ramps would also contain midday storage area for approximately 80 AC Transit buses. The area underneath the ramps would be adequate for 80 vanpool parking spaces. Construction would be staged to ensure occupancy and operation of the replacement bus facilities prior to demolition of the existing Transbay Terminal.

Passenger ticketing and retail space would be available at street level. AC Transit, Greyhound, Amtrak, and Airporter buses would use approximately 50 bus bays on the second and third levels which would cross over Howard Street. Greyhound freight service would also be accommodated inside the terminal. Some Golden Gate Transit buses could layover in the terminal or at a remote storage site. Muni and SamTrans operations would be on surface streets in the vicinity and via either a proposed new Beale-Fremont Pass-Through Facility or via a possible Beale Street transit mall (both options are described in this section). A basement level parking garage could also be constructed for up to 600 vehicles.

Table S-6
Mitigation Options for Demolition of the Transbay Terminal Facility

	Option A	Option B		Option C	Option D
	Bus Terminal Building at Main-Beale Site	**Bus Terminal Building at Transbay Terminal Site**	**Temporary Surface Bus Facility at Main-Beale Site during Construction**	**Permanent Surface Bus Facility at Main-Beale Site**	**Permanent Surface Bus Facility at Transbay Terminal Site**
SURFACE BUS ACCESS (Muni, SamTrans, etc.)	Beale-Fremont pass through or Beale bus mall and turn-around loop	Beale-Fremont pass through	Same as existing, modified as required for demolishing the existing terminal	Beale-Fremont pass through	Beale-Fremont pass through
BAY BRIDGE BUS ACCESS (AC Transit)	New aerial bus ramp adjacent to Fremont auto ramp -- aerial over Harrison, Essex, Folsom, Clementina, First, Fremont, and Beale Streets	New aerial bus ramp along Essex Street Corridor -- aerial over Harrison, Essex, Folsom, Clementina, Tehama, Howard and Natoma streets	Existing aerial bus ramp adjacent to Fremont auto ramp -- aerial over Harrison, Essex, Folsom, Clementina, First, and Fremont streets -- brought to surface at Beale Street	**Option C1:** New aerial bus ramp over Harrison, Essex, Folsom, Clementina, First, and Fremont streets adjacent to Fremont auto ramp -- brought to surface at Beale Street **Option C2:** Use of new Fremont auto ramp and surface streets	Use of new Fremont auto ramp and exclusive bus lane on Fremont Street to Transbay Terminal Site. Use of surface right-of-way over CalTrain subway for exclusive HOV lane from Terminal site to Essex Street freeway on-ramp at Harrison Street.
MIDDAY BUS STORAGE LOCATION	On widened Essex and Fremont aerial bus ramps -- approximately 80 spaces	Widened Essex Street aerial bus ramps -- approximately 65 spaces	Surface lot on vacant Caltrans R/W at Folsom and Fremont Street	Remote surface lot -- Options include 7th and Townsend or 16th and Owens (depending on midday train storage location selected)	**Short-Term:** 106 spaces in CalTrain Terminal Station shell beneath surface bus facility **Long-Term:** Remote surface lot -- Options include 7th and Townsend or 16th and Owens (depending on midday train storage location selected)

Table S-6, continued
Mitigation Options for Demolition of the Transbay Terminal Facility

	Option A	Option B		Option C	Option D
	Bus Terminal Building at Main-Beale Site	**Bus Terminal Building at Transbay Terminal Site**	**Temporary Surface Bus Facility at Main-Beale Site during Construction**	**Permanent Surface Bus Facility at Main-Beale Site**	**Permanent Surface Bus Facility at Transbay Terminal Site**
NUMBER OF BUS BAYS IN TERMINAL	AC Transit = 30 Greyhound = 9 Other = 11 Total = 50	AC Transit = 30 Greyhound = 9 Other = 6 Total = 45	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35
GOLDEN GATE TRANSIT (GGT)	Layover in terminal, in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street
GREYHOUND FREIGHT	In terminal	In terminal	Displaced	In terminal	Adjacent to terminal
TERMINAL CONFIGURATION	Three Story Building	Transbay Terminal Short and Medium Options		Simple roof-and-wall structure (to protect from weather and visually screen)	Surface bus mall
PARKING	About 600 spaces underground (optional)	None	None	None	None
TERMINAL RETAIL	35,000 - 50,000 square feet in ground floor of new terminal	35,000 - 50,000 square feet in ground floor of new terminal	None	None	None

The proposed bus facility could be linked to the underground CalTrain station beneath Beale Street. A optional 950-foot-long pedestrian concourse containing moving sidewalks under Beale Street could be constructed to connect the bus and train terminals with the Embarcadero BART/Muni Metro Station.

Cost estimates for this mitigation option are about $160.3 million. This option is the City of San Francisco's preferred approach. (See Section 10.1.4 for a summary of reasons for this preference.)

Two options for surface street bus access to the new terminal are proposed, as follows.

Surface Bus Access Options - Beale-Fremont Pass Through. Under this option, Muni and SamTrans buses would travel south on Beale Street (from Mission and Market Streets) and turn right into a designated bus-only zone to be located at street level between Mission and Howard Streets, directly above the underground CalTrain terminal. Passengers would be dropped off before buses entered the zone along the west side of Beale Street. The zone would contain areas for passenger loading as well as bus layovers. Exiting buses would turn right from the loading area onto Fremont Street and proceed north towards Mission and Market Streets. Golden Gate Transit buses would operate on Beale Street and Fremont Street. They would drop off and pick up passengers at designated stops.

Surface Bus Access Options - Beale Bus Mall and Loop. Under this option, all buses would travel south on Beale Street and, once past Mission Street, turn left into a two-way, bus-only mall that would run along the east side of Beale Street, as described below under street network modifications. Bus drop-off islands would be provided along the west side of the southbound bus lane. After unloading, buses would continue southward and turn left into a turn-around loop located on the ground level of the new bus terminal at Main and Beale Streets. (Layover areas would be provided next to the loop). Exiting the loop, buses would return northward in a bus-only contra-flow lane towards Mission Street, with pick-up areas located on the east sidewalk of Beale Street.

Option B - New Bus Terminal Building at Transbay Terminal Site

Under Option B, a new bus facility would be constructed directly above the underground CalTrain station at the Transbay Terminal site. Three levels plus a partial mezzanine level would provide for ticketing, passenger loading and unloading, and passenger and bus circulation. New, exclusive aerial ramps adjacent to the Essex Street auto ramp would provide grade-separated bus access between the Bay Bridge and the second and third levels of the new terminal. These ramps would also provide midday storage for up to 65 AC Transit buses.

A total of 45 bus bays would be provided in the terminal for use by AC Transit, Greyhound, Airporter, and Amtrak buses; Golden Gate Transit buses would layover on surface streets in the vicinity. Greyhound freight services would be accommodated in the terminal. No underground parking is possible in this option because the CalTrain terminal would occupy the entire basement level. Retail space would be provided. Elevators and escalators would provide circulation between the bus, mezzanine, street, and underground (CalTrain) levels. Bus access would be via the Beale-Fremont Pass Through as described above.

"Short" and "Medium" Terminal Configurations. Two alternate configuration options are proposed for the bus terminal above the CalTrain terminal at the Transbay Terminal site. A "short" configuration bus terminal would occupy a smaller footprint than that of the present Transbay Terminal. It would cross over First Street on the west end of the building but would stop at Fremont Street on the east end.

The "medium" configuration would be similar in size to the present Transbay Terminal and would cross over both First and Fremont Streets. The medium configuration would accommodate a circular path for buses surrounding a large, enclosed pedestrian waiting concourse inside the terminal.

Cost estimates for this mitigation option for the "short" terminal configuration (including the temporary surface facility described below) are approximately $164.3 million. For the "medium" terminal configuration (including the temporary surface facility), cost estimates are $158.6 million.

To build a New Bus Terminal Building at the Transbay Terminal Site, a temporary bus terminal facility would be needed to continue bus operations during demolition of the existing Transbay Terminal and construction of the new CalTrain and bus terminal on the Transbay Terminal site. The temporary facility would be similar to the new surface bus terminal described as Option C located at the Main-Beale Site, between Main and Beale Streets, on both sides of Howard Street. No large structure is envisioned. AC Transit buses would enter a surface bus lot via the existing aerial bus ramp adjacent to the Fremont Street auto ramp; this ramp would be brought to surface just west of Beale Street.

Due to seismic considerations, Caltrans is considering demolishing the existing eastern loop of the existing bus ramp. If this ramp were to be demolished prior to construction and operation of a new bus terminal building at the Transbay Terminal Site (Mitigation Option B), then alternative surface access would need to be provided to the temporary bus facility.

A total of approximately 35 bus bays would be provided for use by AC Transit, Greyhound, Airporter, and Amtrak buses. Bus access for Muni and SamTrans would be the same as current operations except for minor modifications needed during demolition of the existing Transbay Terminal or construction of the new underground CalTrain terminal and above-ground bus terminal. Golden Gate Transit would operate on the adjacent surface streets. There would not be sufficient room for Greyhound freight operations to continue at the temporary surface facility and these would be displaced to alternate temporary location(s). There would be no vehicle parking and minimal or no space available for retail development.

The temporary surface facility would be built prior to interruption of operations at the existing Transbay Terminal. Following construction of the CalTrain terminal and new bus terminal above it, the temporary facility would be removed and the area it occupied could be made available for other development.

Midday storage for AC Transit buses could be on a surface lot on vacant Caltrans right-of-way at Folsom and Fremont Streets, at Seventh and Townsend (if the new CalTrain storage yard is located at this site) or at Seventh and Sixteenth Streets, east or west of I-280 (if this site is selected for the new CalTrain storage yard). Any space remaining after AC Transit's midday storage needs were met could be used for midday storage of Golden Gate Transit buses.

Option C - New Surface Bus Facility at Main-Beale Site

A third bus terminal mitigation option would be to develop a permanent surface bus facility on the Main-Beale site. A simple roof-and-wall structure for weather protection and visual screening is proposed. This proposal would greatly reduce construction costs in comparison with the multi-level above-ground bus facility envisioned in Options A or B. In Option C, the street-level terminal would occupy both sides of Howard Street between Beale and Main Streets.

AC Transit access to and from the Bay Bridge would be via one of two options: (1) a new aerial bus ramp adjacent to the Fremont auto ramp brought to surface at Beale Street (Option C1); or (2) the new Folsom Street off-ramp (Option C2). Under Option C2, buses would continue east along Folsom Street in mixed traffic and turn north on Main Street into the surface terminal. Return routing would be west on Howard, left on Beale heading south to Bryant Street, right on Bryant heading west to the Sterling Street on-ramp for the Bay Bridge.

Under Option C, a total of approximately 35 bus bays would be provided for use by AC Transit, Greyhound, Airporter, and Amtrak buses. Muni and SamTrans buses would operate via the Beale-Fremont Pass Through facility as detailed in the other options. Golden Gate Transit would operate on the adjacent surface streets.

The surface facility would have room for Greyhound freight services, but would not include underground automobile parking and would offer minimal or no room for retail service development. The cost estimate for the permanent surface lot terminal with direct ramp access mitigation option is approximately $67.7 million (Option C1). The cost of Option C2 is approximately $10 million less because no direct freeway access ramp is included.

The proposed bus facility could be linked to the underground CalTrain station beneath Beale Street. An optional 950-foot long pedestrian concourse containing moving sidewalks under Beale

Street could be constructed to connect the bus and train terminals with the Embarcadero BART/Muni Metro Station.

Midday storage for AC Transit buses would not be provided on new aerial bus ramps but would instead be provided at a remote surface lot. Possible locations include Seventh and Townsend (if the new CalTrain storage yard is located at this site) or Seventh and Sixteenth streets, east or west of I-280 (if this site is selected for the new CalTrain storage yard). Any space remaining after AC Transit's midday storage needs were met could be used for midday storage of Golden Gate Transit buses.

Option D - New Surface Bus Facility at Transbay Terminal Site

Option D would be a designed and landscaped surface bus plaza on the site of the current Transbay Terminal above the CalTrain Terminal Station. AC Transit operations would occur in the surface terminal bus plaza. Buses coming from the Bay Bridge would gain access to the surface terminal using the new Fremont auto/bus ramp and an exclusive bus/car pool lane north on Fremont Street. Exiting the surface terminal, buses would utilize a new, exclusive surface bus roadway located on the surface above the CalTrain subway box heading south to the Essex Street I-80 freeway on-ramp. There would be signalized intersections at all locations where the bus roadways cross existing streets.

For Option D, a total of approximately 35 bus bays would be provided for use by AC Transit, Airporter, and Amtrak buses. A simple roof-and-wall structure for weather protection and visual screening is proposed. This proposal would greatly reduce construction costs in comparison with the multi-level above-ground bus facility envisioned in Options A or B.

Muni and SamTrans buses would operate via the Beale-Fremont Pass Through facility as detailed in the other options. Golden Gate Transit would operate on the adjacent surface streets. Accommodations for Greyhound would be provided adjacent to the surface facility. Capital costs for Option D are estimated at $64.7 million for the surface bus plaza.

This surface option would be built after the existing terminal and ramps were torn down and the underground CalTrain terminal shell was built on the Transbay Terminal site. Construction of the CalTrain terminal shell would be part of a phasing for the CalTrain project, as discussed in Chapter 12. Capital costs for construction of the CalTrain Terminal station shell and the cut-and-cover CalTrain subway section from Folsom Street to the terminal are estimated at some $167 million.

The shell for the CalTrain terminal station would be used for midday bus storage until such time as the CalTrain extension project was fully operational.

Mitigation for Increased Parking Demand

To address the increased parking requirements associated with the CalTrain Extension Alternative, mitigation is proposed that would expand parking opportunities at 12 of the 15 stations projected to have parking deficits in 2010 as a result of increased CalTrain ridership with the extension project, and at one station (Broadway) that could accommodate a portion of the deficit at the Burlingame and San Mateo stations. The 15 stations with a projected year 2010 deficit under the CalTrain Extension Alternative include:

- 22nd Street Station in San Francisco (deficit of 20 spaces)
- South San Francisco Station (52 spaces)
- San Bruno Station (42 spaces)
- Broadway Station in Burlingame (no deficit)
- Burlingame Station (216 spaces)
- San Mateo Station (62 spaces)
- Hillsdale Station in San Mateo (556 spaces)
- Belmont Station (158 spaces)
- San Carlos Station (141 spaces)
- Menlo Park Station (113 spaces)
- Palo Alto Station (75 spaces)
- California Avenue Station in Palo Alto (64 spaces)
- Mountain View Station (55 spaces)
- Sunnyvale Station (204 spaces)
- Santa Clara Station (60 spaces).

Three stations with parking deficits projected by 2010 are not proposed for parking expansion as part of the mitigation for the CalTrain Extension Alternative: the San Francisco Station, San Mateo and San Jose/Diridon Station. The San Francisco Station would be located in an urban setting where CalTrain parking demand would be accommodated through existing private and shared-use lots. Similarly, the San Mateo Station is located in a developed urban setting, where CalTrain parking demand would be accommodated through shared sue in the short-term and at adjacent stations in the long-term. The Diridon Station parking demand would be reasonably accommodated by local lots in the area (that also serve the San Jose Arena and the downtown) or at the adjacent Tamien Station, which is projected to have a surplus of over 200 spaces.

Other Impacts and Mitigation

As explained in Chapter 9, demolition of the Transbay Terminal and of the terminal loop ramp, both contributing elements of the San Francisco-Oakland Bay Bridge, which is eligible for the national Register of Historic Places, are identified as significant environmental impacts that cannot be wholly mitigated. In addition, the project would displace businesses and employees, and would contribute to construction-period noise, dust, access changes, and traffic congestion. These and other impacts associated with the CalTrain Extension Alternative are summarized in Table S-7, and are described fully in Chapters 5, 6, and 7.

Where appropriate and feasible, mitigation measures are proposed as part of the project, and many are also summarized in Table S-7.

While the presence of mitigation under CEQA creates a presumption of significant impacts, NEPA anticipates that an EIS will identify means to mitigate the adverse impacts of a project if such measures are not already included in the proposal action or alternatives. For this reason, some mitigations described in this document are appropriate under NEPA, even though the impacts they address may not be considered significant under CEQA.

Table S-7
Summary of Impacts and Proposed Mitigations

IMPACT CATEGORY	SUMMARY OF MAIN IMPACTS AND PROPOSED MITIGATIONS	
	NO-BUILD ALTERNATIVE	CALTRAIN EXTENSION ALTERNATIVE
Transit Services, Facilities, & Accessibility	Existing travel impedances would be perpetuated. Transbay Terminal & associated ramps would still require retrofit or replacement and code upgrades.	Improved accessibility and reduced travel times (10 minutes on average) between downtown San Francisco and the Peninsula. Overall increase in San Francisco-bound Peninsula transit riders. Better connections between CalTrain and other transportation services (e.g., A.C. Transit, Muni, Muni Metro, BART, Golden Gate Transit) Demolition of the Transbay Terminal would have substantial impacts on AC and Greyhound Transit operations and ridership. Terminal replacement mitigation and new surface bus access are proposed.
Parking	No impact.	Parking demand at some Peninsula CalTrain stations would exceed capacity. Mitigation through expansion of Peninsula parking facilities is proposed. Loss during construction of approximately 900 San Francisco parking spaces and long-term loss of an additional 800 - 900 spaces under all Transbay Terminal replacement options. 640 spaces could be replaced following construction. No mitigation is warranted per the City's Transit First policies.
Automobile Traffic	Traffic congestion on regional freeways and surface streets would increase.	Auto travel times and vehicle miles of travel in the CalTrain Corridor would decrease. Intersection LOS in downtown San Francisco would be similar to the No-Build Alternative. The longer subway option with a portal at Berry and 7th streets (Townsend South/Subway Option) would provide improved traffic flows in the 5th, 6th, 7th, and Townsend street area when compared to the No-Build Alternative and the other Townsend Street options. Incremental delays at local intersections at Peninsula parking lot expansion locations. Re-striping and signing mitigation is proposed near the Hillsdale and Belmont stations.

Table S-7, continued
Summary of Impacts and Proposed Mitigations

IMPACT CATEGORY	SUMMARY OF MAIN IMPACTS AND PROPOSED MITIGATIONS	
	NO-BUILD ALTERNATIVE	CALTRAIN EXTENSION ALTERNATIVE
Land Use	No impact.	Project would support intended development patterns and Transit First policies of City and County of San Francisco, and provide for coordinated development at or near the terminal. No mitigation warranted. Mission Bay development would be less impeded under the longer subway option with a portal at Berry and 7th streets (Townsend South/Subway Option) when compared to the No-Build and other Townsend Street options.
Displacements and Relocation	No impact.	Up to nine properties containing 40 businesses would be acquired and/or relocated. Temporary and permanent easements required for surface and tunnel operations. Tunnel construction may require temporary displacement of basement and ground floor businesses. Up to four business displacements under the Transbay Bus Terminal replacement options. All terminal replacement options would potentially displace five parking facilities. Property acquisition and relocation assistance would be provided pursuant to the federal Uniform Relocation and Assistance Act and California Relocation Act.
Socioeconomics	No impact.	Up to 40 businesses with approximately 300 jobs displaced. Up to an additional eight businesses and 40 employees lost with terminal replacement options. Property acquisition and relocation assistance would be provided pursuant to provisions of the federal Uniform Relocation and Assistance Act and the California Relocation Act.
Fiscal and Economic	No impact.	Demolition of eight privately-owned structures and worst case estimated annual reduction of $748,000 in tax revenues. Total worst case fiscal loss of $557,000 annually with replacement of the Transbay Terminal. Worst case assumes businesses do not relocate in San Francisco and displaced cars do not park in other San Francisco facilities. Sales and Use taxes in the amount of $4.6 million accrue to the City and State due to project construction. Approximately 1,700 direct and 325 indirect employment opportunities over the seven-year construction life of the project; with an additional 515 direct and 100 indirect for construction of a bus terminal mitigation option, yielding an additional $1.5 million in City payroll taxes. Retail and services businesses in terminal area would benefit from increased activity.
Visual	No impact.	Visual changes from proposed stations, tracks, portals, electrification facilities, and storage yard. Dramatic changes with demolition (and eventual replacement) of Transbay Terminal. New visual features would be consistent with the existing surroundings, and would not divide any established neighborhood or change any scenic view or vista.

Table S-7, continued
Summary of Impacts and Proposed Mitigations

IMPACT CATEGORY	SUMMARY OF MAIN IMPACTS AND PROPOSED MITIGATIONS	
	NO-BUILD ALTERNATIVE	CALTRAIN EXTENSION ALTERNATIVE
Historic & Cultural Resources	No impact.	Loss of Transbay Terminal and terminal loop ramp that are contributing elements of the San Francisco-Oakland Bay Bridge, a National Register of Historic Places-eligible resource, and potential effects to Rincon Point/South Beach Historic Warehouse-Industrial District (South End Historic District). Possible effects to 24 subsurface historic archaeological sites during construction. Mitigations to be set forth in a Memorandum of Agreement (MOA) with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.
Noise and Vibration	No impact.	Underground CalTrain extension would not increase area noise levels. No noise-sensitive receptors in locations where the project would be at surface. No ground-borne vibration impacts would occur. Ground-borne noise would exceed residential impact threshold at several buildings. Mitigation would install high-resilience track fasteners or resiliently supported tie systems.
Air Quality	No impact.	No exceedences of State or federal AAQS. Long-term regional benefits from marginal reductions in pollutant emissions.
Geology and Seismicity	No impact.	Characteristics of Bay Mud and fill soils could affect base stability of tunnel and foundation excavations. Seismically-induced ground shaking could damage proposed subway and structures. Mitigation consists of appropriate design and construction techniques.
Hazardous Materials	No impact.	Use and storage of fuels and cleaning solvents at the proposed storage yard could expose workers to hazardous materials. California OSHA standards would be met. Prior to construction, the potential presence of contaminants in soil and groundwater would be investigated and mitigation developed as required.
Construction Period Effects	No impact.	Partial street closures and increases in heavy truck traffic during construction would temporarily change local access, increase congestion, and affect transit operations. Third, Fourth, and Brannan Streets would be affected by lane closures and presence of construction trucks. Some temporary loss of on-street parking. Temporary increases in noise levels, dust and other air borne pollutants. Mitigation would include implementation of basic and enhanced control measures recommended by the Bay Area Air Quality Management District and compliance with San Francisco's Noise Ordinance. A community construction coordination and information program would be established to assure implementation of appropriate mitigation measures for affected businesses and residences.

S-5 ISSUES TO BE RESOLVED & AREAS OF CONTROVERSY

During screening of project alternatives and preparation of this document, every effort has been made to address areas of controversy associated with the CalTrain Extension Alternative. Several unresolved issues remain, however, and are described below.

S-5.1 Selection of a Preferred Alternative with Sub-Options

Following circulation of this DEIS/DEIR and receipt of public and agency comments, the JPB will select a preferred alternative, called the Locally Preferred Alternative (or Preferred Investment Strategy), including a preferred Townsend Street alignment, portal location, storage yard location, propulsion option, and mined tunnel option.

S-5.2 Selection of a Preferred Bus Facility Mitigation Option

The California Department of Transportation (Caltrans) is the current owner of the Transbay Terminal and of the site at Main and Beale streets identified as a possible location for a replacement bus facility. The final decisions regarding who will pay for and construct a new bus facility, and which option will be implemented, are unresolved. It is anticipated that Caltrans will make these decisions, with input from transit operators, the JPB, and the City and County of San Francisco.

S-5.3 System Financing

As described in Chapter 12, sufficient funds have yet to be approved and programmed to construct the proposed project. As part of the selection of a preferred alternative, the JPB will develop a phased implementation program for the project.

S-5.4 Other Issues

Other unresolved issues include characteristics and site-specific impacts of possible joint development at the site of the proposed CalTrain terminal and/or the proposed replacement bus facility. Opportunities for commercial development involving a public-private partnership, or "joint development," have been suggested by some as possible side benefits of the project. Future cumulative effects of reasonable development in the project vicinity have been assumed and analyzed in this DEIS/DEIR, although site-specific impacts of joint development proposals have not been considered, and the precise nature of that development has not been defined. Additional environmental analyses would be required prior to implementation of any joint development proposals.

Other possible areas of controversy include project-related business displacements and construction period effects that would be experienced in San Francisco. The CalTrain Extension

Alternative would provide regional benefits that would equally benefit residents, employees, and visitors in the three counties served.

S-6 AGENCY COORDINATION & APPROVALS REQUIRED

Public agencies formally or informally contacted and consulted during the preparation of this environmental document, including those which received notice or a copy of this DEIS/DEIR, are listed below.

AC Transit
California State Historic Preservation Officer
California Public Utilities Commission
Caltrans, District 4
City of Atherton
City of Brisbane
City of Burlingame
City of Foster City
City of Palo Alto
Golden Gate Transit
Metropolitan Transportation Commission
San Francisco Fire Department
San Francisco Municipal Railway
San Francisco Planning Department
San Francisco Redevelopment Agency
Santa Clara County
Santa Clara Valley Transportation Agency
San Mateo County
San Mateo County Transportation Authority
U.S. Department of Transportation,
    Federal Railroad Administration
U.S. Fish and Wildlife Service

A Technical Advisory Committee comprising representatives of key planning agencies, transit operators, Caltrans, and others, was consulted throughout the alternatives screening process and development of this document. Technical Advisory Committee members are listed in Chapter 10, which also contains a detailed explanation of the public involvement process.

The JPB has approval authority over CalTrain facilities and the proposed CalTrain Extension. Permits and approvals involving other State, federal, and local agencies will also be required prior to project implementation, as described in Chapter 10. Some of the other agencies with approval or permitting authority over aspects of the project include the Federal Transit Administration, the California Department of Transportation, the California Public Utilities Commission, and the City and County of San Francisco.

CHAPTER 1: PURPOSE OF AND NEED FOR THE PROJECT

1.1 PURPOSE

The purpose of the CalTrain Extension Project is to:

- Improve CalTrain service by providing direct access to downtown San Francisco;
- Enhance connectivity between CalTrain and other major transit systems;
- Accommodate the projected growth in future travel demand in the San Jose - San Francisco corridor;
- Enable direct access to downtown San Francisco for possible future intercity and/or high speed rail service;
- Reduce traffic congestion on US Highway 101 and I-280 between San Jose and San Francisco and other routes owing to reduction in private auto usage;
- Reduce vehicle hours of delay on major freeways in the Peninsula corridor;
- Improve regional air quality by reducing auto emissions;
- Support local economic and land use development goals; and
- Enhance accessibility to employment, retail and entertainment opportunities

The primary goal of the CalTrain Downtown Extension Project is to improve CalTrain service while meeting the need to provide direct access to downtown San Francisco. Extending CalTrain service to a new terminal located at the Transbay Terminal site would also enhance connectivity between CalTrain and the other major regional transit systems, including the Bay Area Rapid Transit (BART) System, the San Francisco Municipal Railway (Muni), AC Transit, SamTrans, and Golden Gate Transit. This in turn would increase transit ridership and decrease private auto usage that results in roadway congestion and auto emissions. The proposed linkage between CalTrain and the other regional transit providers would enable more convenient transit travel over a greater portion of the Bay region, enhancing accessibility to employment, retail and entertainment opportunities.

Development of an upgraded regional transportation facility with connections for all the major transit providers brings a large transit user population into a confined area, thereby focusing potential economic and joint development opportunities. Finally, determining a preferred terminal site and the role, if any, of the existing Transbay Terminal site, provides new opportunities to coordinate economic development of various parcels in the present terminal area.

1.2 NEED

The Peninsula Commute Service (or more commonly, CalTrain) is the only commuter rail operator in the San Francisco Bay Area. Passenger trains have operated along the 47-mile-long corridor between San Jose and San Francisco since 1864. Regularly-scheduled service is provided between the South Bay and Peninsula communities of San Jose, Santa Clara, Sunnyvale, Mountain View, Palo Alto, Menlo Park, Atherton, Redwood City, San Carlos, Belmont, Hillsdale, San Mateo, Burlingame, Millbrae, San Bruno, and South San Francisco in Santa Clara and San Mateo Counties, and the Bayshore, Paul Avenue, 22nd Street, and Fourth and Townsend Stations in the City and County of San Francisco. In July 1992, peak period service was extended approximately 30 miles south of downtown San Jose, creating a 77-mile-long corridor, with new stops in South San Jose, Morgan Hill, San Martin, and Gilroy. Figure 1.2-1 provides a map of the CalTrain system with an inset of the study area.

Weekday CalTrain ridership in February 1996 is estimated at 22,200 passengers, and over half of these riders pass through the current CalTrain terminus at Fourth and Townsend streets.[1] Half (some 5,500) of the approximately 11,000 morning riders exit at the terminus station; and, correspondingly, over half of the riders board the train at the terminus in the evening. Since February, 1996, ridership has increased to nearly 24,000.[2]

The following sections detail current and future transportation needs in the corridor that would be served by the proposed project.

1.2.1 Current Deficiencies

The “Gap”

The underlying need for the CalTrain Extension Project relates to one central issue: getting the train as close as possible to where most riders want to go. The concept of passenger train service directly into downtown San Francisco has been the subject of public scrutiny and debate for over a century. The present service has a northern terminus at Fourth and Townsend Streets in San Francisco -- over one mile from the downtown core. The distance between the current CalTrain terminus and most downtown San Francisco job destinations is beyond walking distance for the majority of train riders and requires a bus transfer to complete the journey.

Figure 1.2-2 illustrates the one-mile "gap" which currently exists between major downtown San Francisco activity and employment centers and the present CalTrain terminus.

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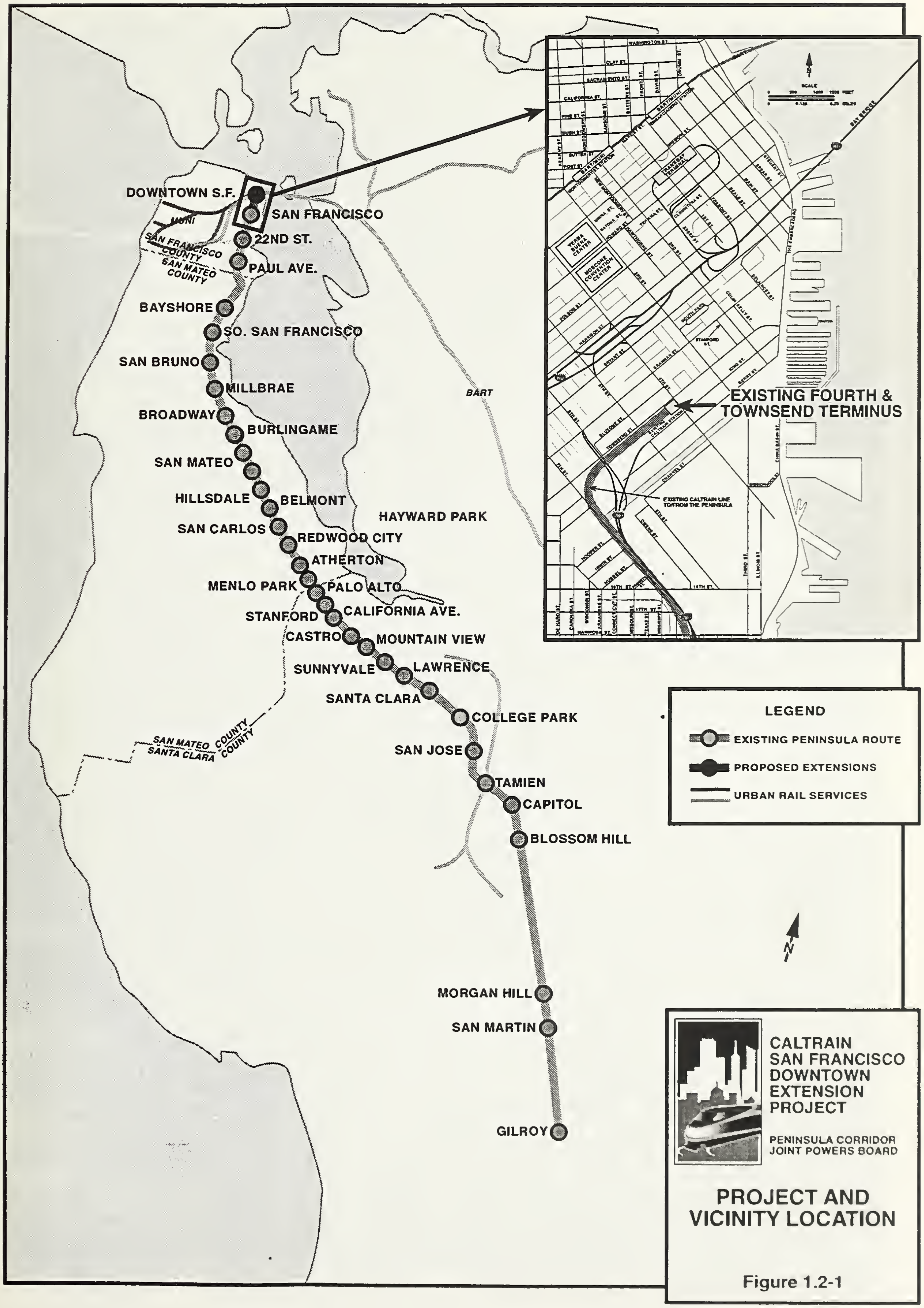
[1] PCJPB, CalTrain On-Board Passenger Survey, February 1994.

[2] *CalTrain Performance Report, 1996.*

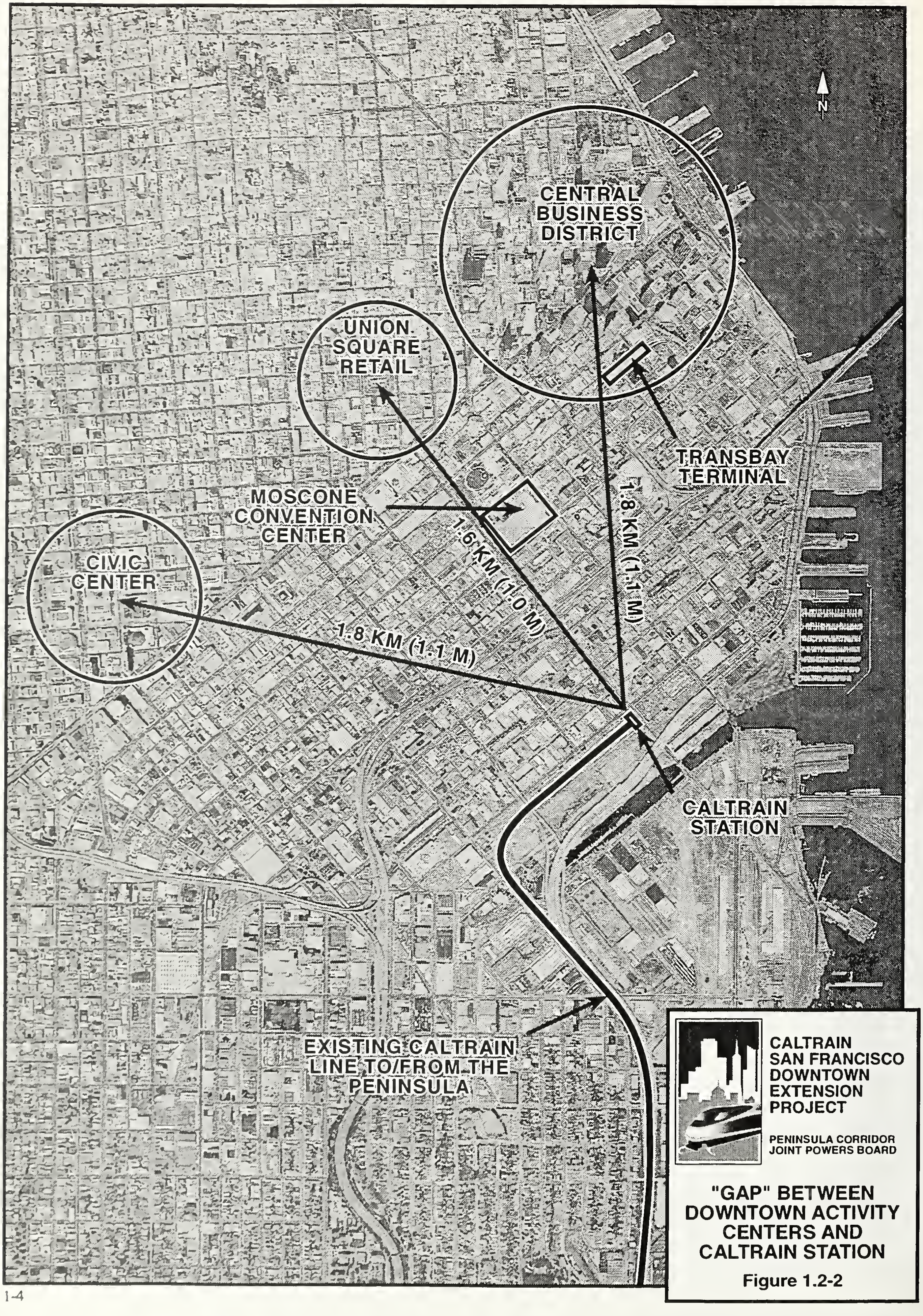

DOWNTOWN S.F.
MUNI
SAN FRANCISCO
22ND ST.
SAN FRANCISCO COUNTY
SAN MATEO COUNTY
PAUL AVE.
BAYSHORE
SO. SAN FRANCISCO
SAN BRUNO
MILLBRAE
BART
BROADWAY
BURLINGAME
SAN MATEO
HILLSDALE
BELMONT
HAYWARD PARK
SAN CARLOS
REDWOOD CITY
ATHERTON
MENLO PARK
PALO ALTO
STANFORD
CALIFORNIA AVE.
CASTRO
MOUNTAIN VIEW
SUNNYVALE
LAWRENCE
SANTA CLARA
COLLEGE PARK
SAN MATEO COUNTY
SANTA CLARA COUNTY
SAN JOSE
TAMIEN
CAPITOL
BLOSSOM HILL
MORGAN HILL
SAN MARTIN
GILROY
N
EXISTING FOURTH & TOWNSEND TERMINUS
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
TRANSBAY TERMINAL
BAY BRIDGE
SCALE
LEGEND
EXISTING PENINSULA ROUTE
PROPOSED EXTENSIONS
URBAN RAIL SERVICES

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

PROJECT AND VICINITY LOCATION

Figure 1.2-1


N
CENTRAL BUSINESS DISTRICT
UNION SQUARE RETAIL
TRANSBAY TERMINAL
MOSCONE CONVENTION CENTER
1.6 KM (1.0 M)
1.8 KM (1.1 M)
CIVIC CENTER
1.8 KM (1.1 M)
CALTRAIN STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

"GAP" BETWEEN DOWNTOWN ACTIVITY CENTERS AND CALTRAIN STATION

Figure 1.2-2

The proposed CalTrain extension and station would allow Peninsula riders to reach downtown without transferring to other modes of travel and would at the same time enable convenient transfers to Muni, BART, and other transit systems.

An underground extension of CalTrain to a station near the current Transbay Terminal site has been identified as "the single most important improvement that can be made to the Peninsula commuter line . . . ."[3] Increases of 100 to 200 percent in future CalTrain ridership to and from San Francisco have been forecast for such an extension, depending on the service level provided (see Table 3.1-7). Extension of CalTrain service into downtown San Francisco is included in the 1994 Regional Transportation Plan. Work done for the Intercity High Speed Rail Commission, which is studying California High Speed Rail potential, has estimated a potential loss of 200,000 in annual high speed rail ridership if the CalTrain terminal is not extended to the Transbay Terminal site (Charles River Associates, August, 1996).

The top five origin-destination station pairs -- Hillsdale-San Francisco, Palo Alto-San Francisco, San Jose-San Francisco, Mountain View-San Francisco and California Avenue-San Francisco -- all include the Fourth and Townsend terminal as one major trip end.

Muni provides direct bus transit connections to the CalTrain terminal in San Francisco. Nine Muni routes serve the CalTrain station at Fourth and Townsend Streets, including three commuter shuttles linking rail passengers with downtown destinations. (See Section 3.1 for a detailed description of current transit services to the CalTrain terminal.)

About 3,600 CalTrain riders, or about two-thirds of the total disembarking at the Fourth and Townsend station, ride the Muni bus routes that connect the CalTrain terminus to downtown San Francisco employment centers: Embarcadero Center, Kearny and Sutter Streets, and Levi Plaza. These riders would be directly served, and their numbers increased, by eliminating the transit transfer link. This thesis is demonstrated in the following sections.

Travel Delay Costs of Transfers from CalTrain Station to Downtown Employment Locations

Based on MTC data, nearly half (49 percent) of the 1990 daily work trips emanating from any of the nine counties with destinations in the City of San Francisco were destined for the area typically identified as downtown San Francisco. As described above, the central downtown area is generally beyond walking distance from the CalTrain San Francisco terminus but is accessible by Muni shuttle bus. The required transfer from rail to bus and additional travel time for buses operating in mixed traffic both discourage transit use and add to transit's cost.

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[3] MTC/JPB Interim Upgrade Study, 1987.

Figure 1.2-3 illustrates existing typical a.m. peak period travel times between the primary Peninsula origins and downtown San Francisco. The travel times for transit modes include average delay or wait times required to transfer between modes (equal to one-half the time spacing -- or headway -- between scheduled bus or train trips) in addition to time spent in the transit vehicle and time required to reach the final destination. The assumed point of origination is the downtown of each respective city and California at Montgomery Streets in downtown San Francisco.

As Figure 1.2-3 shows, a trip from San Jose, Redwood City or Millbrae to downtown San Francisco remains highly competitive on CalTrain compared with SamTrans buses, even with the additional several minutes transfer time between CalTrain and Muni at Fourth and Townsend. CalTrain is the faster mode. Compared to the auto, however, CalTrain is usually a longer trip. The auto provides almost door-to-door service, but the travel time is unpredictable due to possible congestion and/or traffic accidents. Reducing CalTrain travel time and inconvenience by eliminating the transfer at Fourth and Townsend would make the service more competitive with the auto and more reliable overall. CalTrain's increased reliability could offset much of its travel time disadvantage under typical conditions when compared to the auto.

Relocating CalTrain's San Francisco terminus to the Transbay Terminal area is expected to result in a seven percent reduction in the number of person hours of vehicle travel.[4] Morning peak hour delay is expected to be reduced by 20 percent. Implementation of the CalTrain Extension would result in daily travel time savings of 4,400 person hours, which includes 2,900 person hours saved for CalTrain riders and 1,500 person hours for roadway travelers in the corridor. Using FTA procedures, this represents an approximate $12 million per year savings (4,400 hours/day X $11.26/hour X 250 work days/year).

Negative Impact of Transfer on Potential CalTrain Ridership

Possibly the most significant "cost" of the intermodal transfer currently required at the Fourth and Townsend Terminal Station to reach downtown San Francisco is not the cost of added travel time but the adverse impact on CalTrain ridership. Over and above the travel time delay is the inconvenience of even well-coordinated transfers. According to research studies in Britain and the U.S., passengers find transfers one of the most discomforting aspects of transit travel and regard them as "equivalent to three to four minutes of extra waiting time" in addition to the actual

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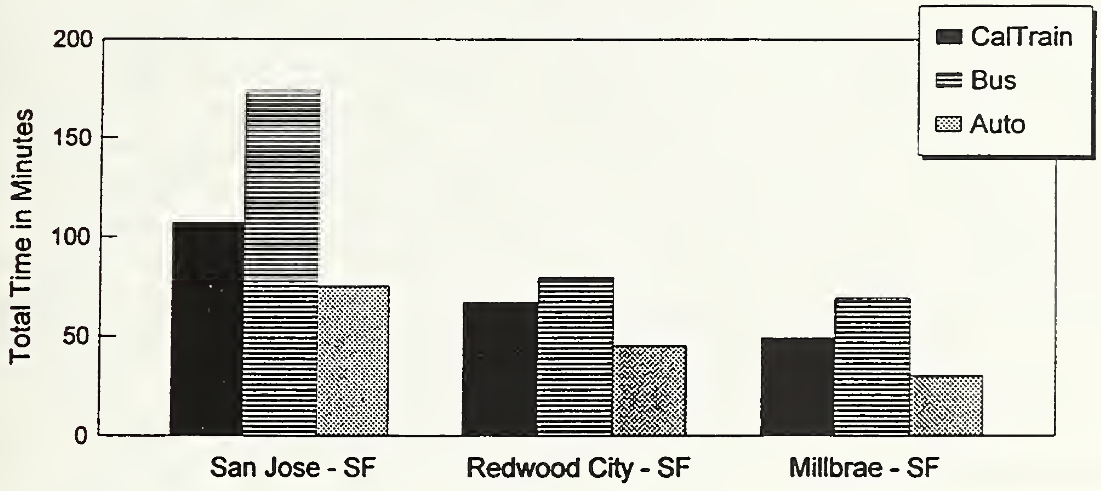
[4] August 27, 1996 memo from Korve Engineering to ICF Kaiser Engineers.

CURRENT TRAVEL TIMES DOWNTOWN SAN FRANCISCO

AM PEAK HOUR NORTHBOUND



Note: Travel time is sum of wait or transfer time and in-vehicle time

CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

CURRENT TRAVEL TIMES
TO DOWNTOWN
SAN FRANCISCO
BY MODE

Figure 1.2-3

transfer time.[5] Passengers may be willing to pay double the base fare to avoid a transfer. Transfer elasticity studies of bus services have estimated that each additional transfer can lead to over a 50 percent decline in ridership.[6]

Transit users consider rail service more reliable and comfortable than most bus services and therefore, the transfer impact could be somewhat greater for a commuter rail service. In any case, the rail-to-bus CalTrain transfer at the Fourth and Townsend Station can be assumed to depress San Francisco-bound ridership by at least 50 percent below its potential with direct rail access to downtown San Francisco.

There are other adverse impacts of the distance between the CalTrain terminal and the downtown area. The overall quality of the transit trip is adversely affected by the Terminal location. A perceived lack of safety and security emerges during dark winter months when the CalTrain Terminal may seem particularly remote or cold. Rainy weather is also a factor that affects CalTrain ridership negatively. The bus transfer also removes riders from spacious trains, where every rider gets a seat, onto buses that do not leave the Terminal until every standing space is full. A missed transfer from the train to a bus is often alleviated by the short headways between Muni buses; but the bus-to-train transfer requires reliability, because the wait--if the train is missed--may be over twenty minutes, or substantially longer during non-peak periods. Moreover, the Muni buses are often subject to severe downtown traffic delays, particularly in the evening rush hours, causing some commuters to miss their evening train.

Intermodal Connections

Transit operators in the nine-county Bay Area have developed their routes and schedules to facilitate inter-operator connectivity. Numerous fare prepayment and pass arrangements are available among operators. Nonetheless, connections between CalTrain and other Bay Area transit operators are constrained by the distance between the CalTrain terminus at Fourth and Townsend Streets and most other downtown transit destinations. Figure 1.2-4 highlights the downtown station locations and pick-up/drop-off points of the major transit operators.

Bus corridors are shown for AC Transit, Golden Gate Transit, and SamTrans routes that serve the downtown. Muni service corridors are shown for bus routes offering direct transfers to and from CalTrain at the Fourth and Townsend terminal.

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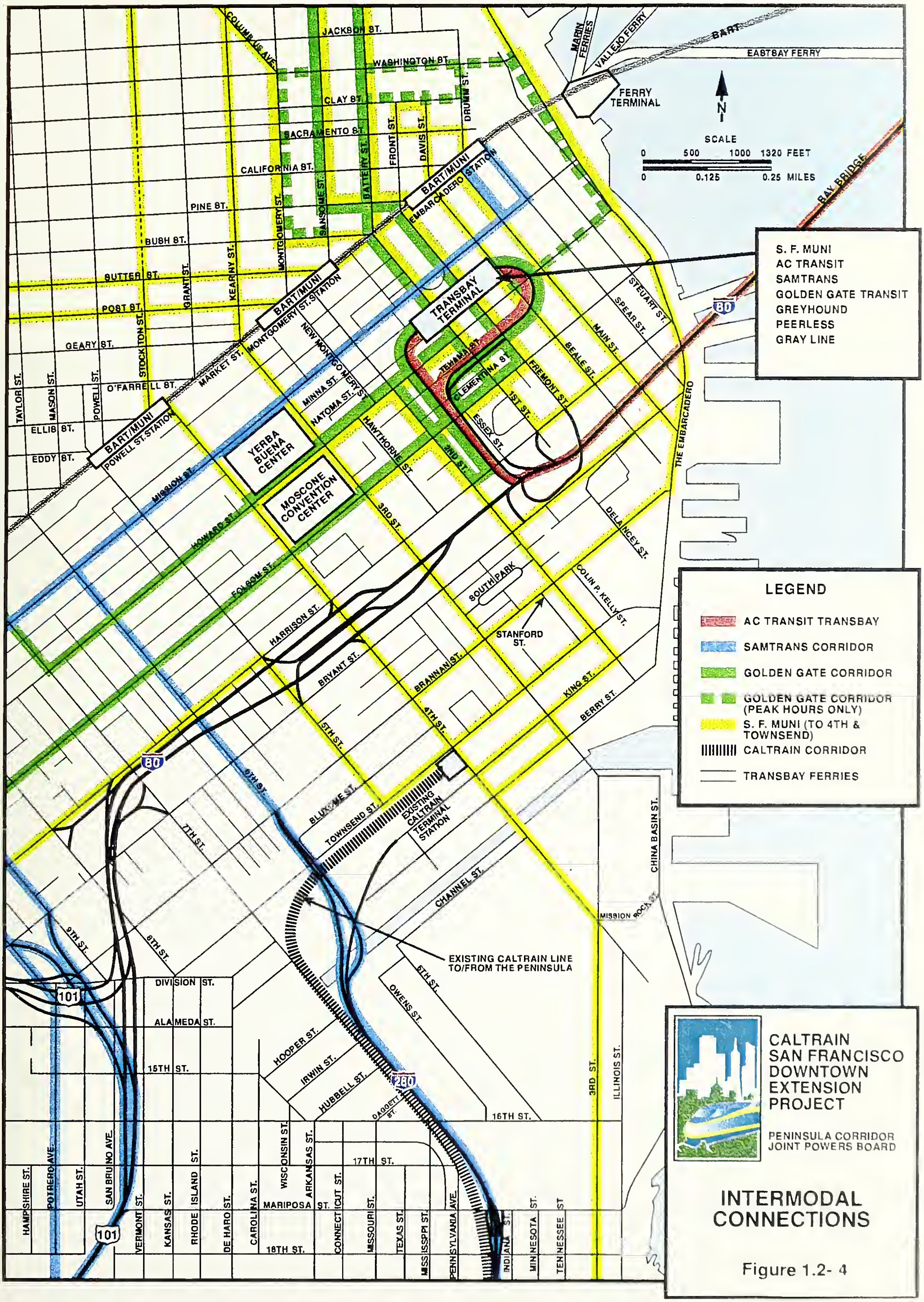
[5] Econometrics, Incorporated, Patronage Impacts of Changes in Transit Fares and Services, U.S. Department of Transportation, September 1980.

[6] Elasticity is an empirically derived or research-estimated measure comparing a change in behavior resulting from a change in a factor that influences behavior. In this case, it is the change in riders due to the change in number of transfers required (Econometrics, Incorporated).



JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
COLUMBUS AVE.
DRUMM ST.
FRONT ST.
DAVIS ST.
BATTERY ST.
SANSOME ST.
MONTGOMERY ST.
KEARNY ST.
GRANT ST.
STOCKTON ST.
POWELL ST.
MASON ST.
TAYLOR ST.
MARIN FERRIES
VALLEJO FERRY
BART
EASTBAY FERRY
FERRY TERMINAL
N
SCALE
0
500
1000
1320 FEET
0
0.125
0.25 MILES
BAY BRIDGE
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
TRANSBAY TERMINAL
S. F. MUNI
AC TRANSIT
SAMTRANS
GOLDEN GATE TRANSIT
GREYHOUND
PEERLESS
GRAY LINE
STEUART ST.
SPEAR ST.
MAIN ST.
BEALE ST.
FREMONT ST.
1ST ST.
ESSEX ST.
TEHAMA ST.
CLEMENTINA ST.
2ND ST.
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HAWTHORNE ST.
MARKET ST.
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
80
THE EMBARCADERO
DELANCEY ST.
COLIN P. KELLY ST.
SOUTH PARK
STANFORD ST.
KING ST.
BERRY ST.
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN TERMINAL STATION
CHANNEL ST.
CHINA BASIN ST.
MISSION ROCK ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
MARIPOSA ST.
18TH ST.
101
280
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
3RD ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.
LEGEND
🟥 AC TRANSIT TRANSBAY
🟦 SAMTRANS CORRIDOR
🟩 GOLDEN GATE CORRIDOR
🟩 🟩 GOLDEN GATE CORRIDOR (PEAK HOURS ONLY)
🟨 S. F. MUNI (TO 4TH & TOWNSEND)
|||||||| CALTRAIN CORRIDOR
—— TRANSBAY FERRIES

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

INTERMODAL CONNECTIONS

Figure 1.2- 4

At present, only the Muni provides direct bus transit connections to the CalTrain terminal in San Francisco, with two routes (80X and 81X) meeting all trains arriving between 6:16 and 8:59 a.m. Nine Muni routes serve the CalTrain station at Fourth and Townsend Streets, including three commuter shuttles linking rail passengers with downtown destinations. The Muni Metro Embarcadero Extension will provide a light rail connection from the Market Street subway to the CalTrain terminal at Fourth and Townsend. Service is expected to start during 1997, but operating schedules may result in increased transfer wait times for CalTrain passengers in comparison with the current shuttle bus service.

Muni buses also provide the only direct public transit connection between the Fourth and Townsend CalTrain Terminal and the Transbay Terminal, the primary drop-off/pick-up location for bus passengers using AC Transit, SamTrans, and Golden Gate Transit services. Muni buses are also the only connecting transit link between CalTrain and the Ferry Building, which is the gateway to Marin, Solano and Alameda County ferry services.

Connections between CalTrain and BART, the major regional rail transit operator in the Bay Area, linking San Francisco to the East Bay and northern San Mateo County, are by Muni bus transfer. AMTRAK buses serve San Francisco CalTrain passengers connecting with intercity AMTRAK trains in Emeryville or Oakland in the East Bay. At San Jose, CalTrain meets most of the daily Capitol Corridor trains or buses to and from Sacramento, and three CalTrain trains connect with the Coast Starlight to Los Angeles.

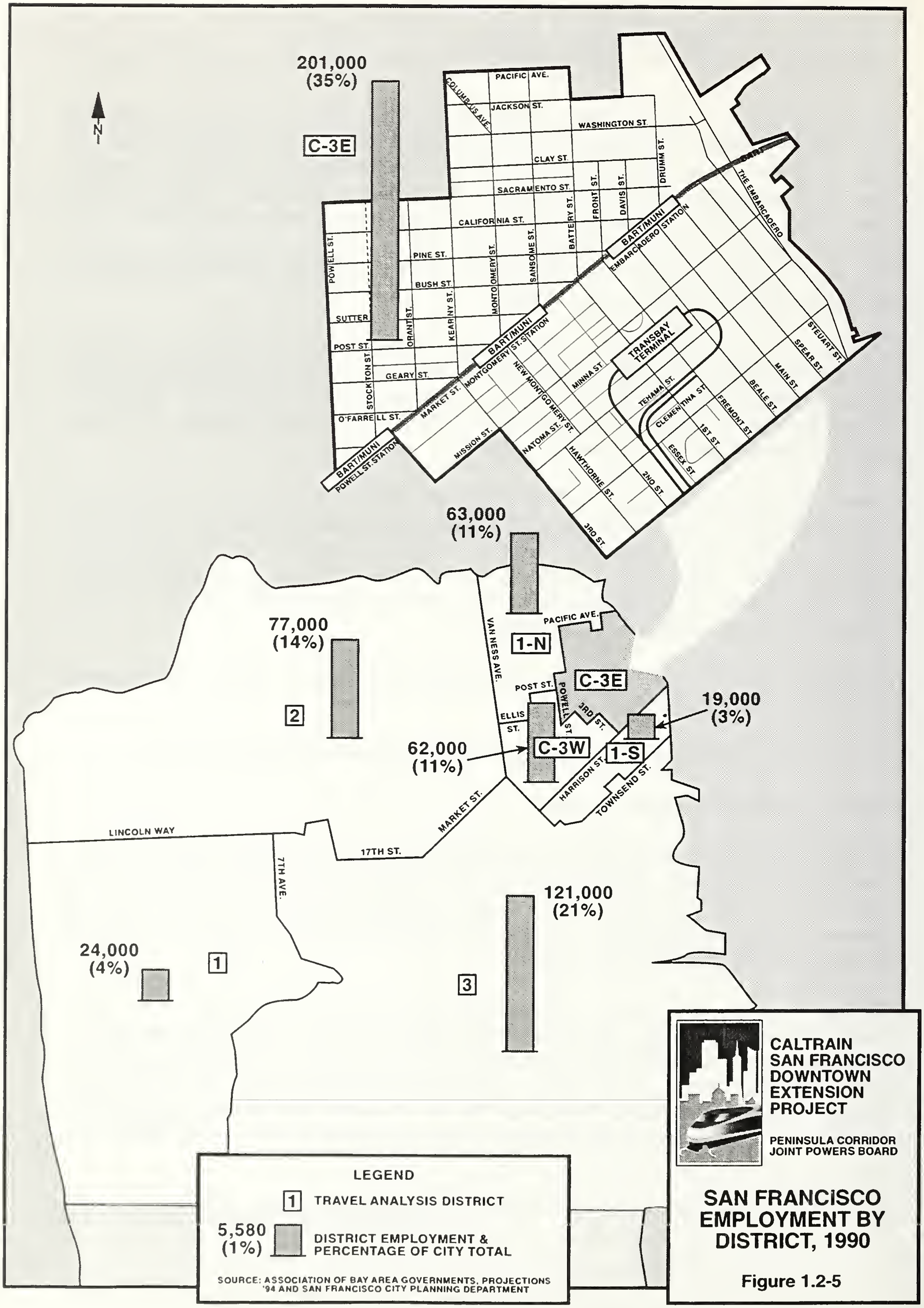
See Section 3.1 for a detailed discussion of current transit services in the project vicinity and to and from the CalTrain Terminal

1.2.2 Current and Future Transportation Demand in the CalTrain Service Area

Current Downtown Area Employment

Figure 1.2-5 provides a comparison of 1990 employment (i.e., jobs) in San Francisco by district. The seven districts shown are based upon major travel analysis zones that the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC, the Metropolitan Planning Organization for regional transportation planning purposes) have adopted for projecting demographic and travel data.

The San Francisco downtown areas included in districts 1-N, 1-S, C-3E and C-3W encompass nearly all “downtown” work locations for the purposes of this study. The area extends from the Bay west to South Van Ness Avenue and south to Townsend Street. The downtown area also contains the Union Square, Market Street Downtown Retail, and Embarcadero Center shopping districts. According to ABAG Projections ‘94, the downtown area provided approximately 345,000 jobs, or 60 percent of San Francisco's total employment in 1990. Nearly three in five


N
201,000
(35%)
C-3E
PACIFIC AVE.
COLUMBUS AVE.
JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER
POST ST.
GEARY ST.
O'FARRELL ST.
POWELL ST.
STOCKTON ST.
GRANT ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART
THE EMBARCADERO
BART/MUNI
EMBARCADERO STATION
BART/MUNI
MONTGOMERY ST. STATION
BART/MUNI
POWELL ST. STATION
MARKET ST.
MISSION ST.
NEW MONTGOMERY ST.
NATOMA ST.
MINNA ST.
HAWTHORNE ST.
3RD ST.
2ND ST.
TRANSBAY TERMINAL
TEHAMA ST.
CLEMENTINA ST.
ESSEX ST.
1ST ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
63,000
(11%)
77,000
(14%)
VAN NESS AVE.
PACIFIC AVE.
1-N
C-3E
POST ST.
POWELL ST.
3RD ST.
ELLIS ST.
19,000
(3%)
2
62,000
(11%)
C-3W
1-S
HARRISON ST.
TOWNSEND ST.
MARKET ST.
LINCOLN WAY
17TH ST.
7TH AVE.
121,000
(21%)
24,000
(4%)
1
3

LEGEND

1 TRAVEL ANALYSIS DISTRICT

5,580 (1%) ▨ DISTRICT EMPLOYMENT & PERCENTAGE OF CITY TOTAL

SOURCE: ASSOCIATION OF BAY AREA GOVERNMENTS, PROJECTIONS '94 AND SAN FRANCISCO CITY PLANNING DEPARTMENT

CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

SAN FRANCISCO EMPLOYMENT BY DISTRICT, 1990

Figure 1.2-5

of these jobs were located in the district C-3E portion of the area, as shown in the figure. The C-3E District largely encompasses what is commonly referred to as the City's central business district.

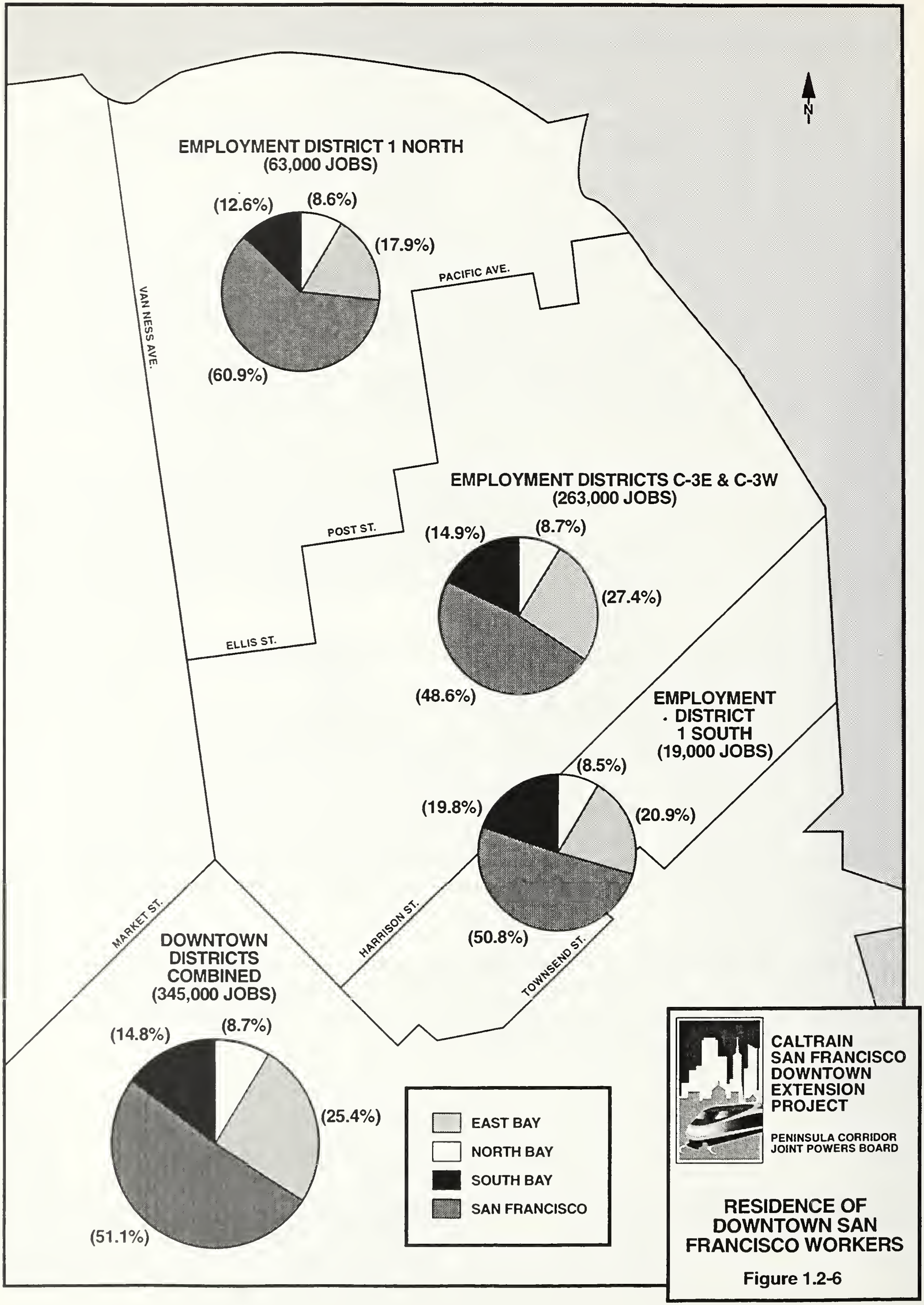
Employment is concentrated north of Market Street to Sacramento Street, between Drumm Street and Powell Street. The next heaviest concentration of jobs is south of Market to Howard Street, from the Bay to Fourth Street. The greatest employment densities are along Market Street, with about 29,000 workers along the south side of Market Street between Second and Beale Streets. North of Market Street, there are areas of employment capacity concentration (about 18,000 jobs) between Pine and Sacramento Streets, between Kearny and Sansome Streets, and between Bush and Post and Kearny and Sansome Streets, where there are about 15,000 jobs. Probably the greatest future development potential is in the South of Market area between Howard and Folsom Streets.

During the decade from 1980 to 1990, San Francisco experienced a 5.4 percent increase in jobs while San Mateo and Santa Clara Counties each experienced increases of almost 23 percent. In 1990, Santa Clara County, with its fast-growing, high-technology companies, had the greatest number of jobs in the Bay Area, compared with other counties. This regional growth emphasizes the fast-growing, two-directional nature of corridor travel demand and the potential for CalTrain to serve both of these travel markets.

Travel Characteristics of Journeys to Downtown San Francisco Employment

The 1990 U.S. Census journey-to-work data indicate that the largest proportion (54 percent) of San Francisco employees also live in San Francisco, and that this group has the highest transit mode share for travel to work (also 54 percent). Of the 482,700 reported daily work trips to the downtown (there are more work trips to or from the downtown than the number of employees due to multiple trips by employees, deliveries, visiting workers, etc.), just over 50 percent emanate from elsewhere in San Francisco, about 26 percent come from the East Bay, and 14 percent come from the South Bay (San Mateo and Santa Clara Counties). Figure 1.2-6 presents the worker place of residence for each downtown employment district and for the four downtown districts combined.

According to "Commute Patterns to Downtown San Francisco," a memorandum to the Transbay Study Technical Advisory Committee from the San Francisco Planning Department (Badiner, 6/30/95), the overall mode split for journeys to work in downtown San Francisco is 54 percent transit, 30 percent drive alone, and 16 percent ride share.


N
EMPLOYMENT DISTRICT 1 NORTH
(63,000 JOBS)
(12.6%)
(8.6%)
(17.9%)
(60.9%)
VAN NESS AVE.
PACIFIC AVE.
POST ST.
ELLIS ST.
EMPLOYMENT DISTRICTS C-3E & C-3W
(263,000 JOBS)
(14.9%)
(8.7%)
(27.4%)
(48.6%)
EMPLOYMENT
DISTRICT
1 SOUTH
(19,000 JOBS)
(8.5%)
(19.8%)
(20.9%)
(50.8%)
MARKET ST.
HARRISON ST.
TOWNSEND ST.
DOWNTOWN
DISTRICTS
COMBINED
(345,000 JOBS)
(14.8%)
(8.7%)
(25.4%)
(51.1%)
EAST BAY
NORTH BAY
SOUTH BAY
SAN FRANCISCO

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

RESIDENCE OF DOWNTOWN SAN FRANCISCO WORKERS

Figure 1.2-6

San Francisco originating work trips have the highest transit mode share (61 percent transit) of all Bay Area residence regions. Commuters from the East Bay are next with a 55 percent transit mode share. San Francisco-destined commuters from the South Bay, on the other hand, have the highest drive alone mode share (44 percent), and the lowest transit mode share (37 percent) compared with commuters from the other primary regions.

This modal split information reflects the superiority of high-quality, high-capacity, direct transit access to downtown San Francisco for San Francisco and East Bay residents relative to that afforded South Bay residents. Relocating the CalTrain Terminal closer to their downtown work locations would improve transit accessibility and potentially result in substantially increased transit ridership for San Francisco-bound commuters from the Peninsula and South Bay.

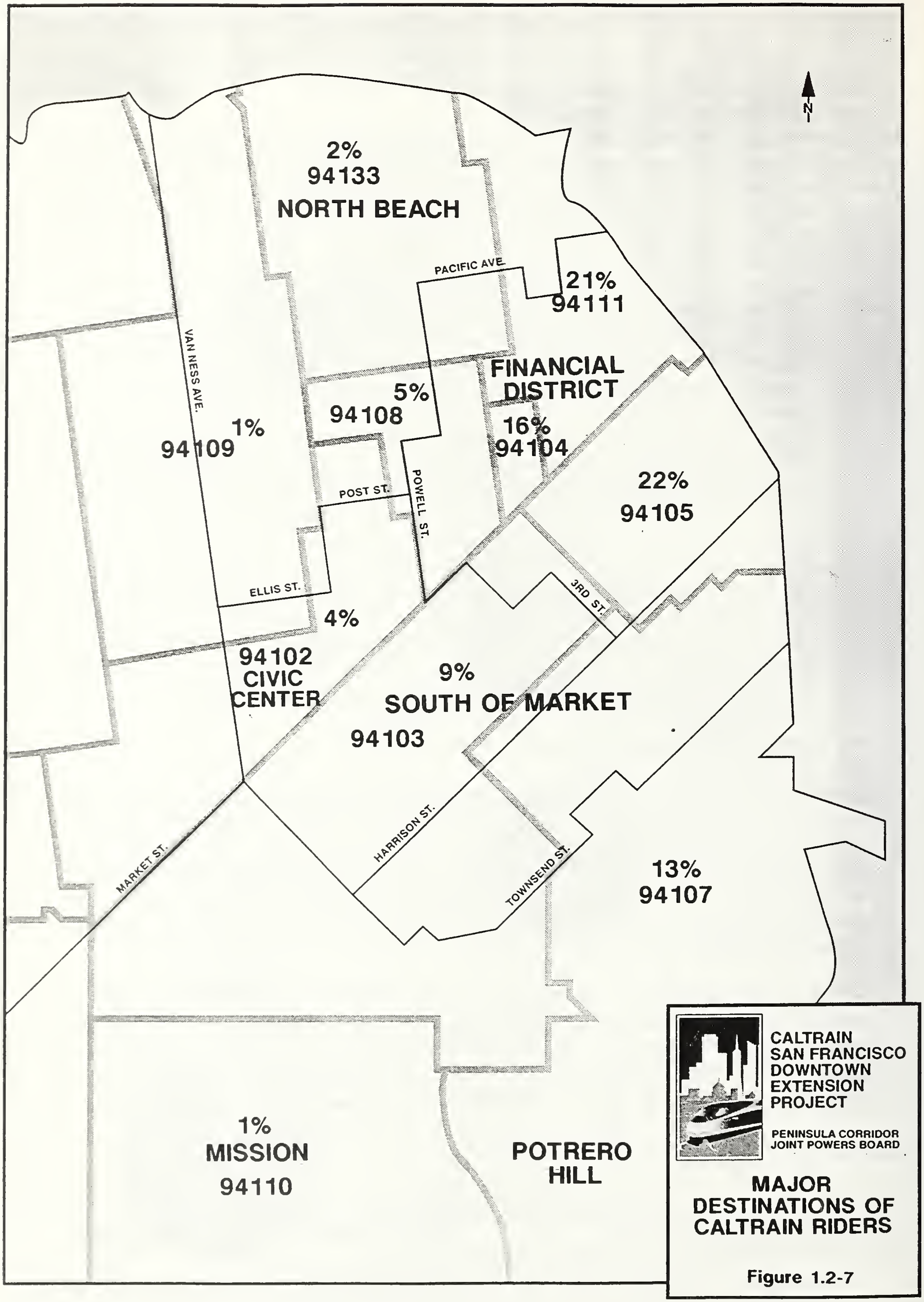
Figure 1.2-7 shows the major destinations by zip code area of northbound CalTrain commuters. The central business district centered along Market Street (zip code zones 94104, 94105, and 94111) dominates with 58 percent of all destinations. The highest proportion of CalTrain rider destinations (22 percent) is within the 94105 area containing the Transbay Terminal site.

Relocating the CalTrain terminus to the current Transbay Terminal site would not only better serve the San Francisco central business district, it would also improve accessibility to Santa Clara County's "Silicon Valley" jobs for San Francisco residents by offering better transit connections within the downtown and better access for the area's expanding residential population. The high transit mode share among San Francisco residents highlights the potential for the extended CalTrain to capture San Francisco riders "reverse commuting" to South Bay jobs.

Future Downtown Area Employment and Travel Demand

San Francisco employment is expected to continue to grow by nearly 16 percent overall during the next 15 years, but anticipated growth is concentrated in a few areas. ABAG Projections '94 anticipates employment increases greater than 50 percent in the area between Harrison and Townsend Streets (District 1 South) during the period from 1990 and 2010. District 3, which covers the area east of Twin Peaks and south of Townsend Street to the County line -- and which is beyond the "downtown" area identified for this study -- is expected to experience an increase in employment of about 33 percent.

The effect of these changes will be to shift the balance of downtown San Francisco employment concentration somewhat southward, although the central business district will retain its majority of all City employment. As of 1990, the central business district (District C-3E) contained about 35 percent of all employment citywide. ABAG Projections '94 anticipate that by 2010, this area will contain about 33 percent of citywide employment. In contrast, areas to the south (Districts


N
2%
94133
NORTH BEACH
PACIFIC AVE.
21%
94111
FINANCIAL DISTRICT
VAN NESS AVE.
5%
94108
1%
94109
16%
94104
22%
94105
POST ST.
POWELL ST.
ELLIS ST.
3RD ST.
4%
94102
CIVIC CENTER
9%
SOUTH OF MARKET
94103
HARRISON ST.
MARKET ST.
TOWNSEND ST.
13%
94107
1%
MISSION
94110
POTRERO HILL
CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT
PENINSULA CORRIDOR
JOINT POWERS BOARD

MAJOR DESTINATIONS OF CALTRAIN RIDERS

Figure 1.2-7

1-S and 3) will increase their share of citywide employment by about four percent, from 25 percent to over 29 percent, as a result of adding 50,000 jobs in this 20-year period. Table 1.2-1 summarizes anticipated changes in San Francisco employment by workplace location.

Table 1.2-1
Anticipated Changes in San Francisco Employment by District

District Workplace	1990 Employment	Percentage of Total	2010 Employment	Percentage of Total	% Change 1990-2010
C-3 East	200,685	35.4	214,351	32.7	6.8
C-3 West	62,176	11.0	75,079	11.4	20.7
1-North	62,931	11.1	66,295	10.1	5.3
1-South	18,999	3.4	29,218	4.5	53.8
2	77,146	13.6	82,533	12.6	7.0
3	121,190	21.4	161,605	24.6	33.3
4	23,521	4.2	26,661	4.1	13.3
San Francisco Total	566,648	100.0%	655,722	100.0%	15.7%

Source: 1990 Census, Journey-to-Work File, Part 3, cited in City and County of San Francisco Planning Department, December 30, 1996Transbay Area Plan: Background Data Report, Draft Addendum, February 15, 1995.

It should be noted that the ABAG projections assume gradual in-fill development in the vicinity of the Transbay Terminal (within District C-3 East), but do not assume any upgrade to the Terminal or an extension of CalTrain into this area. Either improvement could result in greater development or increased clustering of development in this area beyond what is currently projected by ABAG, and may produce a different balance of employment concentration.

1.2.3 Current and Future Roadway Congestion

Economic growth and the corresponding demand for transportation services in the San Francisco Bay Area have exceeded the region's ability to increase roadway capacity. Existing demand for north-south travel along the Peninsula via U.S. 101 and I-280 regularly exceeds existing highway capacities and results in congestion that is increasing in both frequency and duration. Currently, U.S. 101 is the most severely congested freeway through the corridor. Between San Francisco and San Jose a number of roadway segments are at or over capacity during the peak commute hour.

Segments considerably over capacity during the p.m. peak include the area between I-80 and the I-280/U.S. 101 interchange in San Francisco; south of Broadway Avenue in Burlingame to just north of the San Mateo Bridge in San Mateo; the areas north of the State Route 84 and State Route 237 interchanges in Woodside and Santa Clara, respectively; and the area from the San Tomas Expressway to the Capitol Expressway interchange in San Jose. Other segments of the roadway are approaching capacity. No roadway segment in the peak direction (generally southbound in the p.m. peak; and northbound in the a.m. peak) operates better than level of service D during the peak hour, with the majority of segments at level of service E or F. In the non-peak direction, only two short segments near the I-880 interchange and the San Mateo Bridge have been observed to operate on average at LOS C or better. (See Table 1.2-2 for definitions of freeway levels of service.)

Table 1.2-2
Level of Service Criteria for Freeways [1]

Level of Service	Description	Volume/Capacity Ratio & Speed
A	Free-flow conditions with a high level of maneuverability.	0.00 to 0.30 65 mph
B	Free-flow conditions but presence of other vehicles is noticeable. Minor disruptions easily absorbed.	0.30 to 0.47 65 mph
E	Minor disruptions cause significant local deterioration.	0.47 to 0.70 64 mph
D	Borders on unstable flow with ability to maneuver severely restricted due to congestion.	0.70 to 0.89 61 mph
E	Conditions at or near capacity. Disruptions cannot be dissipated and cause queues to form.	0.89 to 1.00 53 mph
F	Forced or breakdown flow with queues forming at locations where demand exceeds capacity.	Greater than 1.00 Variable

Note: [1] Based on a design speed of 65 miles per hour.

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209 (Washington, D.C., 1994), p. 3-9

Without future roadway improvements, congestion on corridor freeways is bound to worsen to the point where travel is diverted and the peak period spreads into the midday and to later in the evening. Bottlenecks will constrain movement through the corridor. MTC's travel projections for the Peninsula corridor, based on the planned future transit (no CalTrain extension) and highway capacities for the year 2005 indicate that northbound morning peak-hour vehicle demand at the U.S. 101/I-280 interchange in San Francisco would be approximately 22,000 vehicles, exceeding the existing interchange capacity by 57 percent. These high levels of congestion will take a toll on economic development by constraining goods and people movements.

Opportunities to improve highway capacity are constrained by a number of factors, including the need for extensive and costly right-of-way acquisitions and potentially significant environmental impacts, such as displacements of residences, businesses, and natural resources. For these reasons, substantial capacity improvements to U.S. 101 and I-280 cannot be assumed to address long-term travel demands in the corridor, and CalTrain provides a vital transportation alternative to costly highway capacity expansion.

1.2.4 Future Parking Demand in Downtown San Francisco

A shift in corridor travel from auto to transit with an extension of CalTrain service would reduce parking demand in downtown San Francisco. An estimated 2,000 fewer parking spaces would be required in the area based on the projected increase in CalTrain ridership directly attributable to the CalTrain Extension. This reduction in demand would offset most of the existing parking loss attributable to the project (see Chapters 5 and 6). Less parking-related traffic would reduce congestion on local streets. More land would potentially become available for development to higher uses. Also, the reduction in parking demand and supply attributable to the CalTrain Extension supports City of San Francisco planning objectives to reduce the need for parking in downtown San Francisco and elsewhere.

1.2.5 Corridor Travel and Air Quality

High rates of auto ownership and vehicle miles of travel have contributed to air quality problems throughout California. Several of the pollutants of concern include ozone, nitrogen oxides and sulfur dioxides (precursors of smog); carbon monoxide; and particulate matter.

The San Francisco Bay Area's air quality has actually improved in recent years, largely in response to technological improvements in motor vehicles and less polluting fuels. The project study area is within the Bay Area Air Basin (BAAB), which was recently designated under the federal Clean Air Act as an attainment area for ozone (O3), sulfur oxides (SOX), and nitrogen oxides (NOX). The BAAB has experienced no exceedences of the federal carbon monoxide (CO) standard since 1992 and an application for designation as a federal attainment area for this pollutant will be submitted. However, the BAAB is still a federal nonattainment area for particulates (PM_{10}) and does not meet the State of California's more stringent standards for both for PM_{10} and O3. The BAAB also is not formally designated in attainment with the State's more stringent CO standard, although exceedences of the State standard have not occurred in recent years.

Because transportation is the major contributor to CO, NOX and O3, increasing auto travel threatens the area's improvement in air quality. Growing congestion will add to the potential problems because of increased emissions of vehicles operating in stop-and-go traffic. Shifting commuters and other travelers to higher occupancy modes is highly desirable to restrain the growth in auto travel. Improved CalTrain service offers the greatest potential for increased high occupancy travel along the San Francisco Peninsula, particularly in southern San Mateo and Santa Clara counties, the areas with the most severe air quality problems in the corridor. Based upon projections of potential CalTrain use in 2010, over 4,000 daily auto trips would be removed from corridor roadways as a result of extending service to a downtown San Francisco terminal.

1.2.6 Opportunities For Coordinated Downtown Development

A number of projects that are currently under way, under study, or recently completed focus on transportation or related improvements in the areas northeast of the present CalTrain terminal. These projects have the potential to affect area travel patterns and transit needs, and coordination with the present CalTrain Extension Project is essential. Such coordination offers an unrivaled opportunity to achieve integrated development of transportation facilities and other land uses in the project area. An example is the JPB's development of mitigation options for bus terminal replacement sites for the proposed CalTrain project on the basis of prior work achieved by Caltrans, the San Francisco Planning Department, and the San Francisco Redevelopment Agency, as described below.

Transbay Terminal Area Plan

A Policy Advisory Committee representing the transit operators using the existing Transbay Terminal, in cooperation with Caltrans and the City of San Francisco, studied alternatives to upgrade or replace the Transbay Terminal at First and Mission Streets. The study addressed seismic strengthening, building code improvements, and the design and layout limitations of the present terminal. It also evaluated alternative designs, including a new or upgraded Transbay Terminal on the site of the present terminal or at the Main-Beale Street site (south of the 201 Mission Street building and north of Folsom Street). Both of these sites are being evaluated as replacement mitigation options for impacts to the Transbay Terminal under the proposed project (see Chapter 6). The study also considered development opportunities created by the new transit terminal. High-rise commercial office and retail uses were highlighted as showing the greatest promise with respect to land use compatibility with a terminal.

Construction of either a joint terminal or facilities in close proximity to one another would serve the interests of both CalTrain and other regional transit riders, creating an intermodal transit hub in the area. The transit hub would concentrate a large transit user population into a confined area, thereby focusing potential economic and joint development opportunities. A more efficient functional terminal design would also support City urban design goals and provide for development of some of the surrounding properties to higher and better uses.

Other Related Projects

The following paragraphs highlight a few other related projects for their coordination issues and potential to support or be served by the CalTrain Extension. Further detail and an evaluation of land use impacts and development opportunities with the proposed project are presented in Chapters 4, 5, and 6 of this document.

Mission Bay. Mission Bay is a 300-acre site bounded by Townsend, Mariposa, and Seventh Streets, and China Basin. In 1991, the City of San Francisco approved a development proposal for the site which would have created 4.8 million square feet of office space, 900,000 square feet of light industrial and institutional space, and 8,700 residential units. Catellus Development Corporation, the project sponsor, has since terminated its agreement with the City, and is currently considering revisions to the development program. Recent public announcements have indicated that the revised proposal will include predominantly high density housing north of Mission Creek, with "entertainment retail" uses near the proposed baseball stadium. Proposed uses south of Mission Creek have not been announced, although Catellus and the City have had discussions with the University of California at San Francisco, which is looking for an expansion campus site.[7]

The JPB has a permanent surface easement on property within the Mission Bay project area that is currently used for railroad purposes. Existing surface rail uses associated with CalTrain conflict with policies of the City's *Mission Bay Plan*, and may affect the development potential of that portion of the Mission Bay site.

New Ballpark. A new ballpark is currently proposed by the San Francisco Giants organization for the area between Third Street, King Street, Second Street, and the San Francisco Bay. Proposition B, passed by San Francisco voters in March, 1996, enables the City to revise its planning and zoning ordinances to allow for construction of a baseball park in this location. Service to the ballpark is a consideration for the proposed project.

Proposed Rincon Entertainment Complex. The San Francisco Redevelopment Agency Commission is reviewing a possible waterfront redevelopment project in the blocks bounded by Folsom, Spear, Harrison, and Beale streets. The site is under consideration as a possible entertainment complex (including a multi-plex theater, retail uses, a residential component, and possibly office uses) to be funded from private sources. Locating such a facility proximate to public transit would encourage use of transit to the complex and reduce the potential traffic congestion resulting from large numbers of people entering and leaving the area in a short time span. Such facilities also promise to increase the potential tax base needed to generate tax revenues for future transportation improvements in the area.

South of Market District. The South of Market District is emerging as an area of mixed-use business, entertainment and residential uses. Converted warehouse buildings house San Francisco's multimedia community and a variety of artists and designers. The area's galleries and studios are supported by the museums and other cultural activities in the Yerba Buena Center. In addition, there is a substantial amount of infill and conversion construction, including live-work spaces and offices for design professionals. According to the Transbay Area Plan Background Data Report, February 7, 1995, over 2.4 million square feet of office space have been approved by the City for development within this area. These South of Market developments re-emphasize the potential for CalTrain to serve two-directional Peninsula corridor demand.

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[7] *San Francisco Chronicle*, Monday September 30, 1996, p. A17; and Tuesday, October 1, 1996, p. A17.

CHAPTER 2: ALTERNATIVES

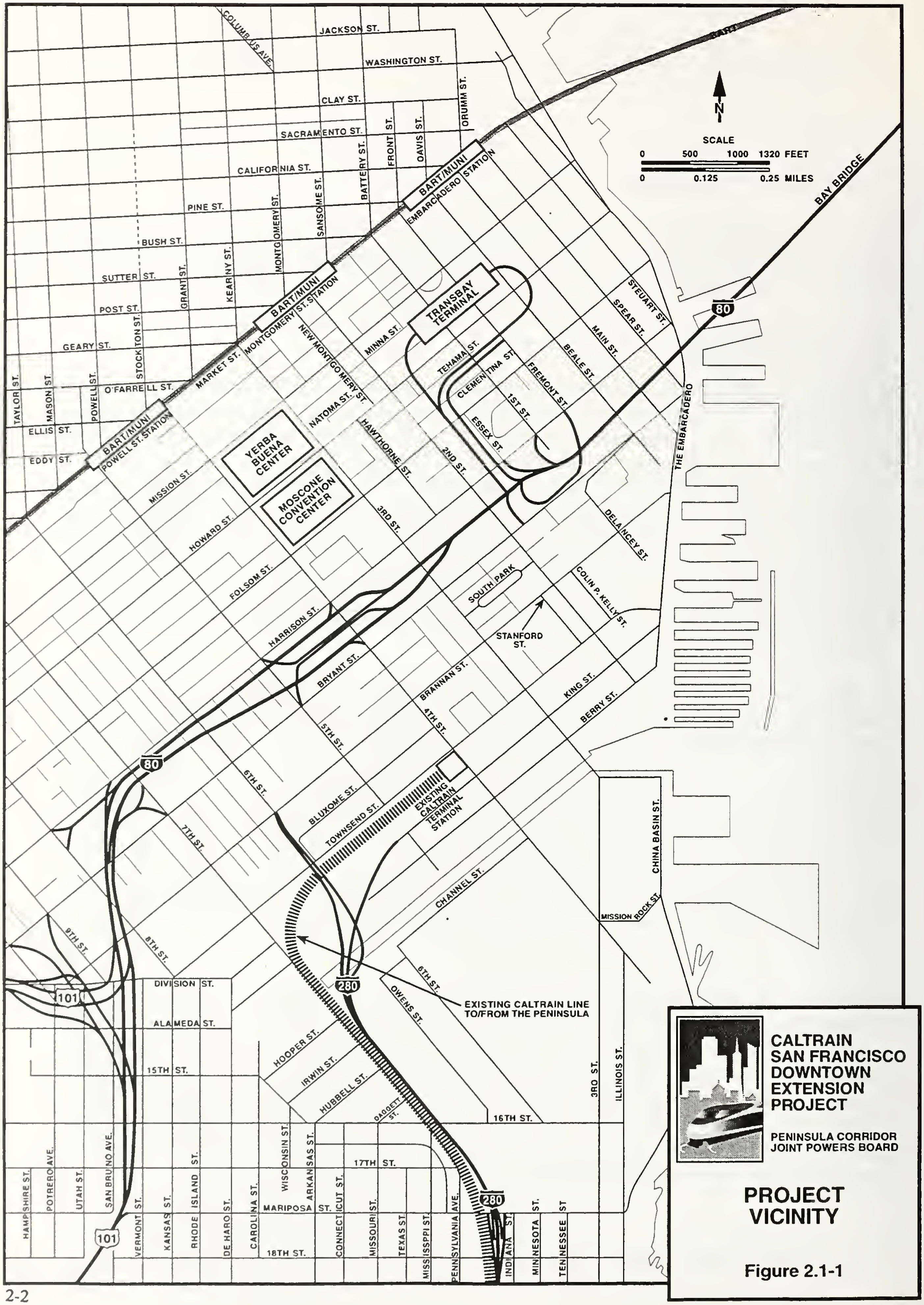
The proposed project is the extension of CalTrain from its present terminus at Fourth and Townsend Streets in San Francisco to a downtown station location, a distance of approximately 1.3 miles. The current and proposed future station vicinity is shown in Figure 2.1-1.

2.1 BACKGROUND

A number of prior studies have evaluated options for locating a CalTrain station in downtown San Francisco. The 1975 Peninsula Transit Alternatives Project (PENTAP) recommended several actions including public acquisition of the Southern Pacific (SP) right-of-way and relocation of the Fourth and Townsend Station to the downtown core. The 1984 Caltrans San Francisco Terminal Relocation Study recommended a below-grade alignment from I-280 and Sixth Street to the Transbay Terminal area and predicted that this extension would attract some 30,000 passenger boardings at a new Transbay Terminal station alone. In 1987, the newly-formed Peninsula Corridor Joint Powers Board (JPB) sponsored the Interim Upgrade Study, which recommended a two-track subway extension to an underground station near the Transbay Terminal. This study identified the extension as "the single most important improvement that can be made to the Peninsula commuter line at the present time."

In 1989, the Urban Mass Transportation Administration (UMTA), now the Federal Transit Administration (FTA), authorized JPB to prepare an Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report (AA/DEIS/DEIR) for the project. A joint Notice of Intent/Notice of Preparation was issued on January 18, 1989. The scoping process began with two formal scoping meetings on February 15, 1989, and a Scoping Report was published in March 1989. Additional public meetings and JPB agenda items provided the public with the opportunity to identify alternatives and environmental issues to be addressed in the AA/DEIS/DEIR. Comments from public meetings along with an initial screening of alternatives led to the three alternatives evaluated in the AA/DEIS/DEIR. The AA/DEIS/DEIR was completed but was not released due to lack of funding commitments for the local share of the project costs.

The project was held in abeyance until late 1993 when the JPB joined with the Metropolitan Transportation Commission (MTC) to identify ways to reduce costs and review federal, State, and local funding sources to finance a less costly project. This study evaluated nine project alternatives. Following public review, two alternatives emerged as the most viable. The JPB passed a resolution (No. 1994-8) that identified electrified service extended to a terminal at Market and Beale Streets as the Locally Preferred Alternative (LPA). The resolution also designated electrified service extended to the Transbay Terminal as an alternative to be carried forward for conceptual engineering and environmental analysis.


COLUMBUS AVE.
JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
TAYLOR ST.
MASON ST.
POWELL ST.
STOCKTON ST.
GRANT ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
MARKET ST.
NEW MONTGOMERY ST.
MINNA ST.
TRANSBAY TERMINAL
TEHAMA ST.
CLEMENTINA ST.
1ST ST.
ESSEX ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
NATOMA ST.
HAWTHORNE ST.
2ND ST.
MISSION ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
HOWARD ST.
3RD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
SOUTH PARK
STANFORD ST.
DELANCEY ST.
COLIN P. KELLY ST.
BRANNAN ST.
KING ST.
BERRY ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN TERMINAL STATION
CHANNEL ST.
THE EMBARCADERO
BAY BRIDGE
80
280
101
N
SCALE
0 500 1000 1320 FEET
0 0.125 0.25 MILES
CHINA BASIN ST.
MISSION ROCK ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
MARIPOSA ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
3RD ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

PROJECT VICINITY

Figure 2.1-1

Consequently, in May 1995, FTA reissued a Notice of Intent in the Federal Register and the JPB reissued a Notice of Preparation to announce the resumption of EIS/EIR preparation for the project. The scoping process resumed with the distribution of Issue Number 1 (May 1995) of the project newsletter, "On the Right Track" and two public workshops in June 1995.

Conceptual engineering and environmental studies focused on the two terminal site alternatives. A variety of horizontal and vertical alignment extension options, construction techniques, terminal configurations, propulsion options, and alternate storage yard locations were evaluated. The alternative screening process and key decisions are described in the JPB's *Design Options Screening Report* (September, 1995), a copy of which is available for review at JPB offices. Public participation activities conducted in conjunction with these studies are described in Chapter 10 of this DEIS/EIR.

The engineering and environmental studies and public and agency reviews succeeded in narrowing the range of practicable alternatives to two: the No-Build Alternative and the CalTrain Downtown Extension to the Transbay Terminal Site Alternative. This chapter describes these alternatives in detail, including background assumptions, physical and operating characteristics, capital costs, and operating and maintenance costs.

In January 1995, the JPB selected these two alternatives for inclusion in the DEIS/DEIR. In March 1995, the San Francisco Board of Supervisors passed a resolution stating its preference for the CalTrain Downtown Extension to the Transbay Terminal Site. Both alternatives are under consideration at this time. Selection of a preferred alternative will not be made until after consideration of public and agency comments on the information presented in this document.

Alternatives considered and withdrawn from further study, including alignment, profile, construction technique, terminal configuration, propulsion and storage yard options, are also described herein along with the reasons why they were eliminated from further study.

2.2 NO-BUILD ALTERNATIVE

The No-Build Alternative consists of existing CalTrain service plus funded improvements to the 2010 horizon year, other committed bus, rail, and roadway improvements, and a BART extension to the San Francisco International Airport. This Alternative is the No-Project Alternative under CEQA.

2.2.1 CalTrain Operations and Capital Improvements Under the No-Build Alternative

Under the No-Build Alternative, the CalTrain terminal is assumed to remain at Fourth and Townsend Streets. Train service is assumed to remain at its current 60 trains per day level or increase to 86 daily trains. Under the daily 86-train assumption, peak hour service is assumed to increase only slightly, and most trains would be added during the midday, off-peak hours. Peak operating demands on the present terminal are therefore expected to change only slightly.

The higher frequency of trains may reduce midday storage needs because more trains would be kept in operation throughout the day. No changes are anticipated to maintenance or control procedures, and the types of signal and communication systems are not expected to change solely as a result of midday train frequency increases.

The following capital improvements also are included in the No-Build Alternative:

- Improvements to the existing CalTrain Fourth and Townsend Street terminal designed to facilitate transfers to the Muni Metro King Street extension,
- Rehabilitation of CalTrain track and stations,
- Purchase of three new locomotives and 17 new passenger cars to provide increased service and improved disabled access,
- Replacement of the existing fleet of 20 diesel locomotives between the years 2005 to 2010,
- Improvements to key stations designed to improve access for the disabled,
- Construction of a maintenance and storage facility,
- Grade crossing improvements in San Mateo County, and
- Relocation of the San Mateo, Hayward Park, and Castro/San Antonio Road Stations.

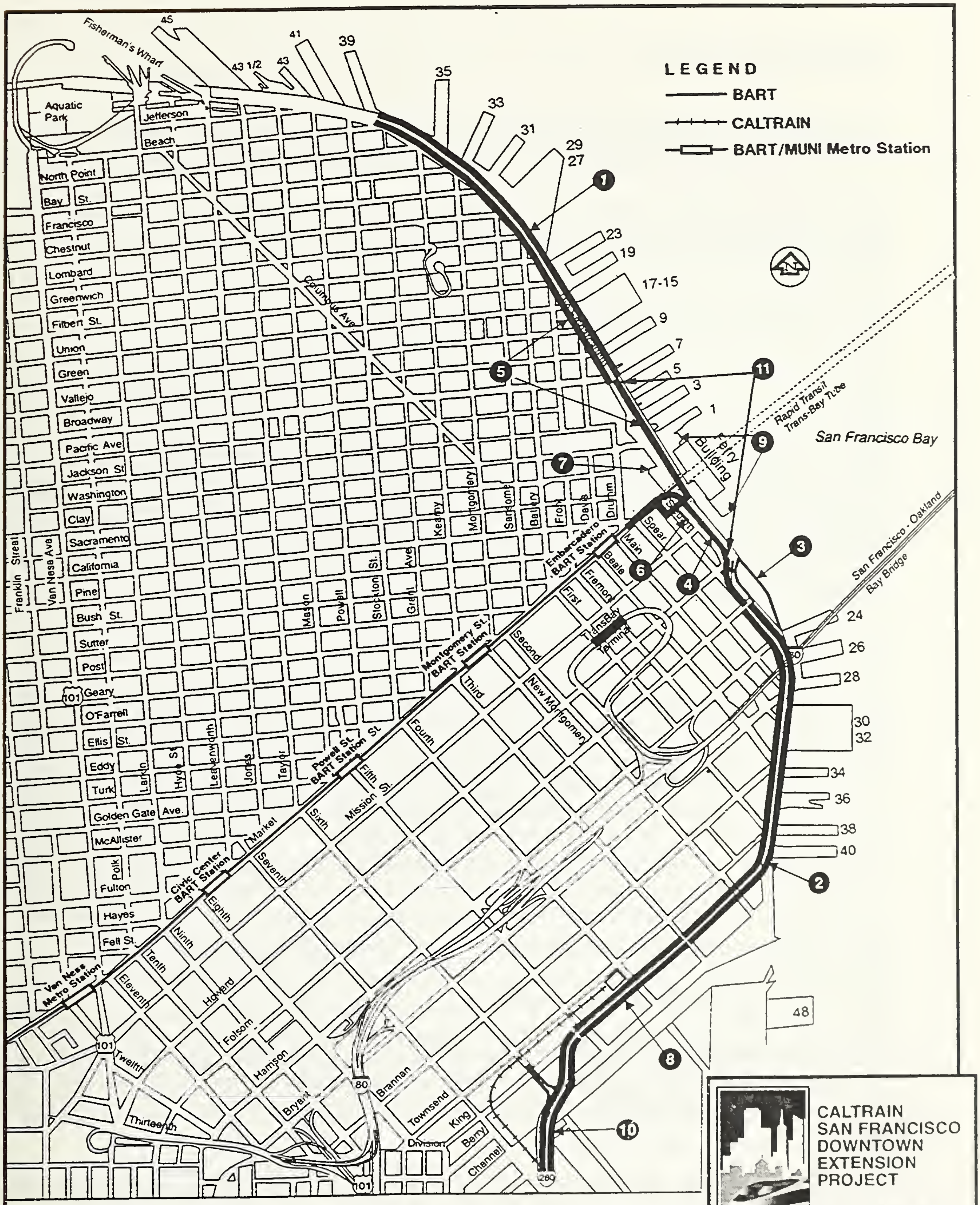
2.2.2 Muni Facilities and Related Bus Service Under the No-Build Alternative

Planned, ongoing, or constructed Muni projects assumed in the No-Build Alternative include the Muni Metro Turnback Project, Muni Metro Extension, Muni F-Line Project, and Muni Bus Layover Facility Expansion. These and other transportation improvement projects within the Waterfront area are depicted in Figure 2.2-1.

The Muni Metro Turnback Project involves installation of underground track and turnback track from Market Street to Folsom Street. Construction is virtually complete.

In concert with the Turnback, extension of Muni Metro along The Embarcadero and King Street between Market and Fifth Streets is currently under construction. Completion is scheduled for late 1996, allowing for light rail service to the current CalTrain terminal. The station at Fourth and King Streets, located in the median of an at-grade, double-track exclusive guideway, will serve as the last of four new stations on the two-mile light rail extension. Tail tracks to the west between Fifth and Sixth Streets will allow for turnbacks of light rail trains.

Muni plans to extend the historic streetcar F-line service from Castro Street to Fisherman's Wharf. Service is now operating on the route from Castro Street to the Transbay Terminal. Tracks have been constructed for the segment on The Embarcadero from Broadway to Pier 39. Two additional segments are under design: the Fisherman's Wharf loop from Pier 39 to Jones Street, and the mid-Embarcadero segment from Market and First Streets to Broadway. The Fisherman's Wharf loop is currently under design and is scheduled for completion in 1997. The


LEGEND
BART
CALTRAIN
BART/MUNI Metro Station
Fisherman's Wharf
Aquatic Park
45
41
39
43 1/2
43
35
33
31
29
27
23
19
17-15
9
7
5
3
1
24
26
28
30
32
34
36
38
40
48
Jefferson
Beach
North Point
Bay St.
Francisco
Chestnut
Lombard
Greenwich
Filbert St.
Union
Green
Vallejo
Broadway
Pacific Ave
Jackson St
Washington
Clay
Sacramento
California
Pine
Bush St.
Sutter
Post
Geary
O'Farrell
Ellis St.
Eddy
Turk
Golden Gate Ave.
McAllister
Fulton
Hayes
Fell St.
Franklin Street
Van Ness Ave
Polk
Larkin
Hyde St
Leavenworth
Jones
Taylor
Mason
Powell
Stockton St.
Grant Ave
Kearny
Montgomery
Sansome
Battery
Front
Davis
Drumm
Columbus Ave
Spear
Main
Beale
Fremont
First
Second
Third
Fourth
Fifth St.
Sixth
Seventh
Eighth
Ninth
Tenth
Eleventh
Twelfth
Thirteenth
Market St.
Mission
Howard
Folsom
Harrison
Bryant
Brannan
Townsend
King
Berry
Channel
Division
New Montgomery
TransBay Terminal
Embarcadero BART Station
Montgomery St. BART Station
Powell St. BART Station
Civic Center BART Station
Van Ness Metro Station
Ferry Building
Rapid Transit Trans-Bay Tube
San Francisco Bay
San Francisco - Oakland Bay Bridge
101
80
280
1
2
3
4
5
6
7
8
9
10
11

1. North Embarcadero Roadway Project and F-Line/MUNI Metro Extension (Under Construction)
2. South Embarcadero Roadway Project and MUNI-Metro Extention (Construction Complete)
3. Rincon Point Park
4. MUNI-Metro Turnback Project (Under Construction)
5. MUNI F-Line Project
6. MUNI Ferry Bus Terminal Expansion
7. Mid-Embarcadero Open Space Project
8. MUNI-Metro Extension, King Street Segment
9. Ferry Terminal Expansion
10. I-280 Ramps to King Street
11. Mid-Embarcadero Roadway

CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

WATERFRONT TRANSPORTATION PROJECTS

Figure 2.2-1

mid-Embarcadero segment is expected to be completed by the year 2000. In addition, Muni is evaluating the connection between the Muni Metro extension described above and the F-Line.

Following implementation of the F-line and light rail service on the Muni Metro extension, Muni plans to eliminate duplicate bus service on the 32-Embarcadero and restructure the 80X, 81X and 82X routes.

2.2.3 BART to San Francisco International Airport

In June 1996, BART and SamTrans adopted a project to extend BART from the town of Colma, through the cities of South San Francisco and San Bruno to the City of Millbrae and to the San Francisco International Airport (SFO). A station is proposed to be constructed in each of the cities and at the airport. A BART/CalTrain intermodal station is planned at Millbrae Avenue to facilitate passenger transfers between CalTrain and BART. The BART extension is scheduled for completion in the year 2000. Upon reaching Tanforan, BART trains would alternate between Millbrae and the airport stations. Note that because the BART SFO Extension is included in the No-Build Alternative, the future travel demand forecasts for the CalTrain Extension also assume that BART to the airport is already in place.

2.2.4 SamTrans

SamTrans restructured its routes serving San Francisco in conjunction with the inauguration of BART service to Colma in February 1996. Two routes (2S and 22D) were truncated at the Colma BART Station, but Routes 1F and 5M that serve Colma BART continue to downtown San Francisco. Midday and evening service on Route 5M were truncated at Colma BART and the 23X shuttle operating between the Colma park-and-ride lot and Daly City BART has been eliminated. SamTrans bus service changes are anticipated to occur with implementation of a BART extension to the San Francisco International Airport. According to the BART-San Francisco Airport Extension FEIR/FEIS, Volume 1 (pg. 3.1-8), SamTrans has indicated that "extensive feeder bus service would be established to the new BART stations but a commensurate reduction in express service from San Mateo County to downtown would likely occur."

2.2.5 Roadway and Street Improvements

The No-Build Alternative assumes completion of the City's Waterfront Transportation Projects, including street and roadway improvements along the San Francisco waterfront from Fisherman's Wharf to King and Sixth Streets. These projects are highlighted in Figure 2.2-1 and described below.

The North Segment project for The Embarcadero, completed in 1995, includes a four-lane surface roadway with the F-line historic streetcar extension in the median, a promenade, traffic signal coordination, pedestrian improvements, and landscaping from Broadway to North Point Street.

The South Segment project for The Embarcadero, completed in 1994, includes a four-lane surface roadway, Muni Metro Extension, a promenade, and landscaping from Folsom Street to Third and King Streets.

King Street between Third and Fifth Streets is being redesigned as a four-lane surface roadway with the Muni Metro extension in the median, new sidewalks, and landscaping. In conjunction with the City's Waterfront Transportation projects, Caltrans and Catellus Corporation are demolishing the stub-end of the I-280 freeway between Third and Sixth Streets, and Caltrans is constructing new on- and off-ramps linking I-280 and King Street at Fifth Street. Completion is scheduled for the Summer 1997.

The Mid-Embarcadero Roadway/Terminal Separator Project focuses on replacement facilities for the Embarcadero Freeway and Terminal Separator Structure ramps that were damaged in and removed as a result of the 1989 Loma Prieta earthquake. An environmental impact statement and report was prepared for this project. The preferred alternative in the Final EIS/EIR would modify the Fremont Street auto ramp to provide direct access to Folsom Street; widen The Embarcadero roadway between Broadway and Folsom to six lanes (two lanes would become curbside parking during the off-peak); widen the eastbound I-80 approach to the existing Fourth Street off-ramp between Sixth Street and the ramp; reopen Davis Street between Clay and Washington Street; and provide a package of surface street and operational improvements. At Washington Street, two new left turn lanes would facilitate traffic flow into Chinatown. Provision for a possible future surface light rail spur from The Embarcadero along Washington Street into Chinatown, and an extension of the 83 bus line on Pacific Street to The Embarcadero, are also included. The Draft EIS/EIR was published in August 1995, with public hearings in September, 1995. The Final EIR was certified by the San Francisco Planning Commission in September 1996. A Record of Decision on the EIS/EIR has not yet been issued by the Federal Highway Administration.

2.3 CALTRAIN DOWNTOWN EXTENSION TO THE TRANSBAY TERMINAL SITE ALTERNATIVE

The CalTrain Downtown Extension to the Transbay Terminal Site Alternative (hereafter called the CalTrain Extension Alternative) consists of an extension of CalTrain from the present San Francisco terminus at Fourth and Townsend Streets to an underground terminal on the site of the present Transbay Terminal at First and Mission Streets. The extension would consist of two tracks branching to six tracks within a new underground terminal, and is described in three segments: Townsend Street Segment, Mined Tunnel Segment, and Folsom Street to Transbay Terminal Segment. This "build" alternative incorporates the following options:

- Three alignment options along Townsend Street,
- Three alignment options for tunneling under Rincon Hill as the extension passes from Townsend Street to Folsom Street,
- One alignment option for the Folsom Street to Transbay Terminal segment,

- Three propulsion options for powering the trains, and
- Two optional locations for a new CalTrain storage yard.

These elements are shown on Figure 2.3-1 and described in detail in the following sections. In addition, the CalTrain Extension Alternative assumes all elements described under the No-Build Alternative (except for those transportation services or facilities that would be replaced or discontinued as a result of construction and implementation of the CalTrain Extension Alternative.)

2.3.1 Alignment Options

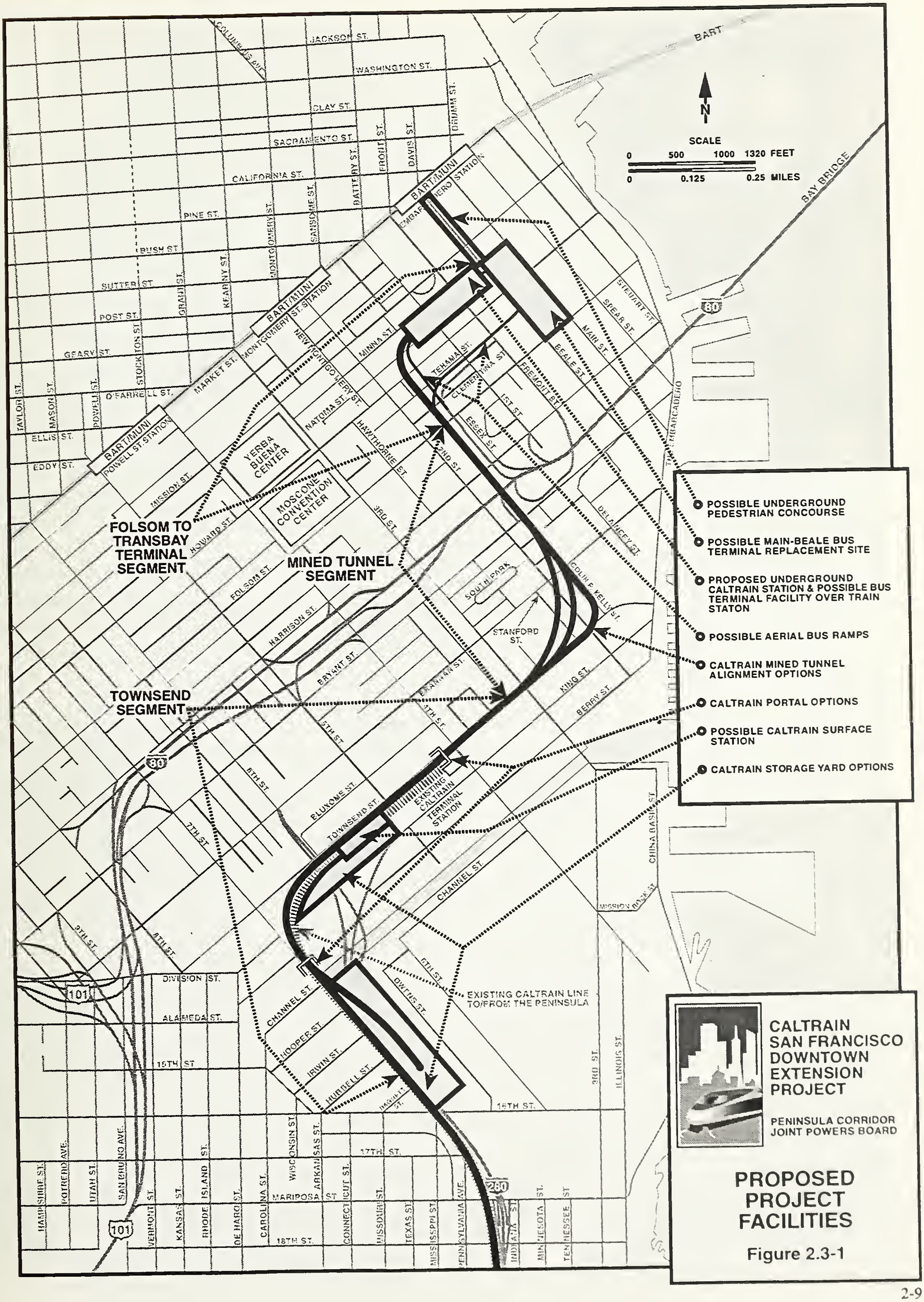
Alignment and portal options are described below for three segments of the CalTrain Extension Alternative: Townsend Street Segment, Mined Tunnel Segment, and Folsom Street to Transbay Terminal Segment.

Townsend Street Segment

There are three alignment options for the segment under the I-280 Freeway from 16th Street to Townsend Street and along Townsend Street between Third and Seventh Streets. The options are called: (1) Townsend-Center, (2) Townsend-South Side, and (3) Townsend-South/Subway.

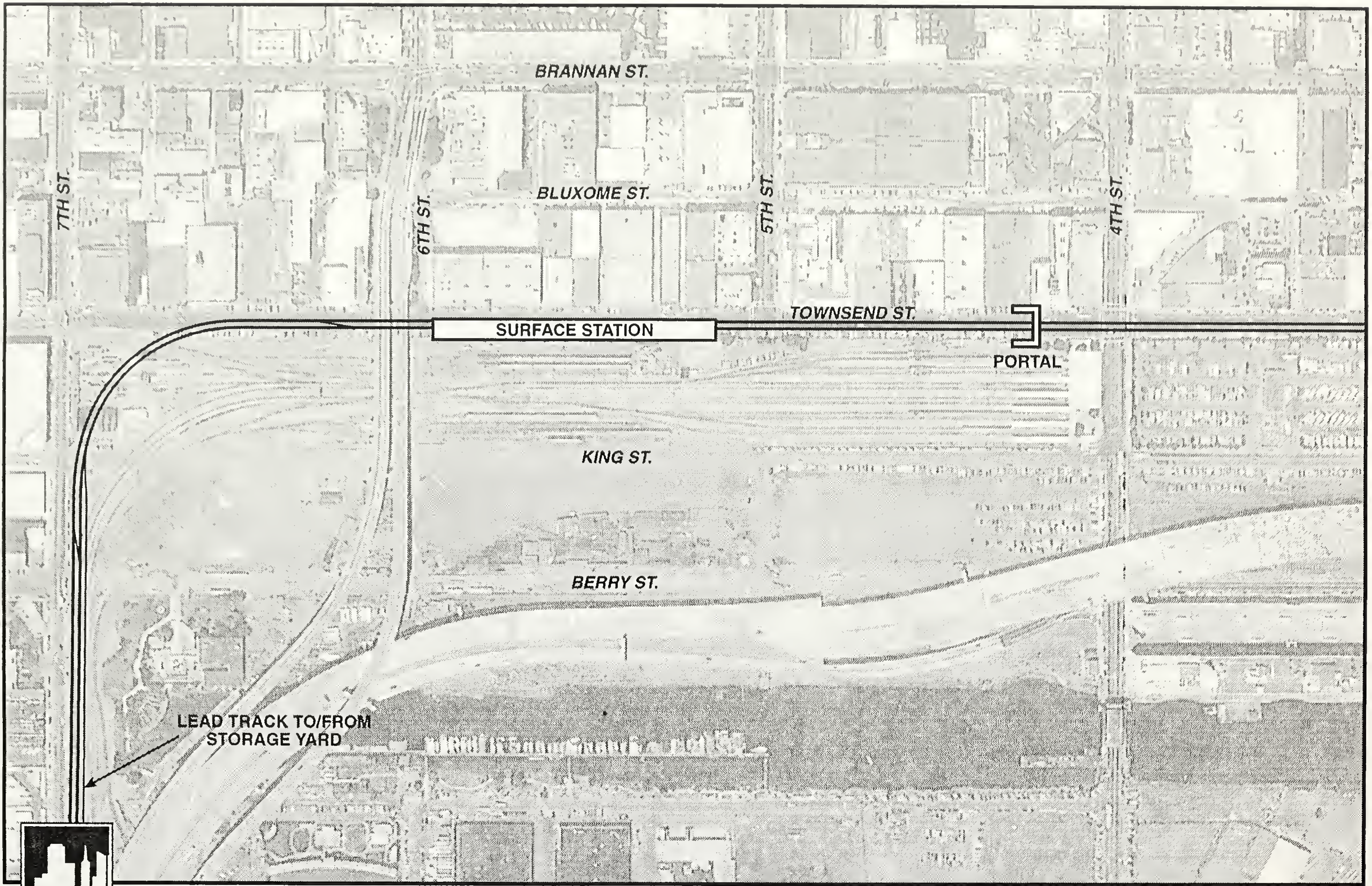
Townsend-Center Option. As shown in Figure 2.3-2, the Townsend-Center Option would travel on the surface from 16th Street, curve east as it approaches Townsend Street, cross two newly constructed eastbound traffic lanes of Townsend Street, and remain on the surface in the center of a reconstructed Townsend Street to Fifth Street. Townsend Street, between Seventh and Fourth Streets, would be widened to approximately 150 feet to accommodate two CalTrain tracks, as well as two traffic, one parking, and one bike lane in each direction. Eight-foot sidewalks would be constructed on each side. Approximately half (75 feet) of the widened Townsend Street would be within Catellus-owned Mission Bay area (on property for which the JPB has a permanent easement). At-grade crossings could occur at Berry, King, Fifth, and Sixth Streets, should these streets be extended across the CalTrain alignment in the future. At-grade crossings of the eastbound lanes of Townsend Street between Sixth and Seventh Streets would be required for this option.

A new surface CalTrain station would be constructed between Fifth and Sixth Streets to serve Mission Bay and the proposed new baseball park recently approved by San Francisco voters (Proposition B, 1996), to be located south of King Street and east of Third Street extending to the San Francisco Bay.


BART
N
SCALE
0 500 1000 1320 FEET
0 0.125 0.25 MILES
BAY BRIDGE
80
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
FOLSOM TO TRANSBAY TERMINAL SEGMENT
MINED TUNNEL SEGMENT
TOWNSEND SEGMENT
EXISTING CALTRAIN TERMINAL STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
SOUTH PARK
STANFORD ST.
THE EMBARCADERO
101
280
JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
MARKET ST.
MISSION ST.
MINNA ST.
NATOMA ST.
HOWARD ST.
TEHAMA ST.
CLEMENTINA ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
TOWNSEND ST.
KING ST.
BERRY ST.
CHANNEL ST.
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
MARIPOSA ST.
18TH ST.
COLUMBUS AVE.
TAYLOR ST.
MASON ST.
POWELL ST.
STOCKTON ST.
GRANT ST.
KEARNY ST.
MONTGOMERY ST.
NEW MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
STEUART ST.
SPEAR ST.
MAIN ST.
BEALE ST.
FREMONT ST.
1ST ST.
ESSEX ST.
2ND ST.
HAWTHORNE ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
DELANCEY ST.
COLIN P. KELLY ST.
ELUXOME ST.
CHINA BASIN ST.
MISSION ROCK ST.
OWENS ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.
POSSIBLE UNDERGROUND PEDESTRIAN CONCOURSE
POSSIBLE MAIN-BEALE BUS TERMINAL REPLACEMENT SITE
PROPOSED UNDERGROUND CALTRAIN STATION & POSSIBLE BUS TERMINAL FACILITY OVER TRAIN STATON
POSSIBLE AERIAL BUS RAMPS
CALTRAIN MINED TUNNEL ALIGNMENT OPTIONS
CALTRAIN PORTAL OPTIONS
POSSIBLE CALTRAIN SURFACE STATION
CALTRAIN STORAGE YARD OPTIONS
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

PROPOSED PROJECT FACILITIES

Figure 2.3-1


BRANNAN ST.
BLUXOME ST.
7TH ST.
6TH ST.
5TH ST.
4TH ST.
TOWNSEND ST.
SURFACE STATION
PORTAL
KING ST.
BERRY ST.
LEAD TRACK TO/FROM STORAGE YARD

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TOWNSEND-CENTER OPTION

Figure 2.3-2

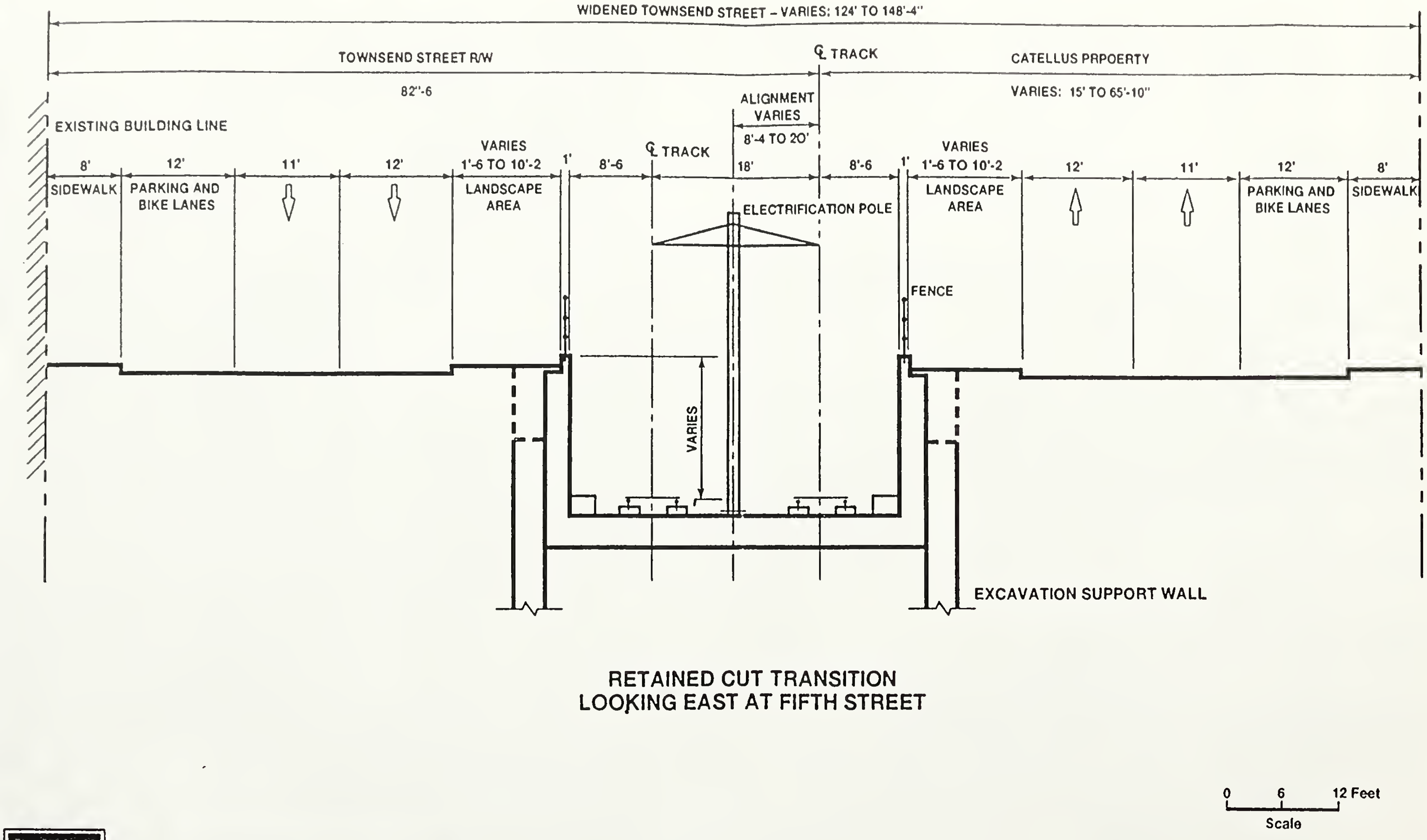
Under this option, CalTrain would transition to an underground alignment between Fourth and Fifth Street, with a portal just west of Fourth Street. The alignment would descend in a retained, open cut (U-wall) section extending 650 feet to a tunnel portal, as shown in Figure 2.3-3. The subway alignment, which would continue under Townsend Street to just west of Third Street, would be constructed by cut-and-cover methods.

Townsend-South Side Option. As shown in Figure 2.3-4, the Townsend-South Side alignment option would place the CalTrain Extension along the southern side of Townsend Street, with the two CalTrain tracks entirely within the Catellus-owned Mission Bay area (on property for which the JPB has a permanent easement). A new surface station would be built between Fifth and Sixth Streets to serve Mission Bay and the ballpark. A proposed parallel third track south of the proposed surface station could provide an additional passenger boarding area and could serve as a lead track to one of the proposed storage yard options.

Beyond Fifth Street, the alignment would descend into a tunnel portal located just west of Fourth Street. The U-wall section would be within the Catellus-owned Mission Bay area (on property for which JPB has a permanent easement) and would avoid the need for the grade crossing of the two eastbound lanes of Townsend Street associated with Townsend-Center Option; however, at-grade crossings could still be needed at Berry, King, Fifth, and Sixth Streets, should these streets be extended across the CalTrain alignment. The subway alignment under Townsend Street from Fourth to Third Street would be constructed by cut-and-cover methods (See Figures 2.3-4 and 2.3-5).

Townsend-South/Subway Option. Of the three Townsend Street Options, the Townsend-South/ Subway Option would include the longest underground segment. The alignment would run parallel to and south of existing Townsend Street from a proposed portal at Seventh and Berry Streets, descending into a U-wall section from Hooper to Berry Streets along the existing CalTrain mainline track. The alignment is shown in Figure 2.3-6. A cut-and-cover tunnel would be constructed northward along the east side of Seventh Street and then curve to the south side of Townsend Street, remaining within Catellus-owned Mission Bay area (on property for which the JPB has a permanent easement) to just west of Fourth Street. The tunnel alignment would then shift northward under Townsend Street.

This tunnel alignment would be approximately one-half mile longer than the other two Townsend Options. It would allow for the extension of Berry and King Streets west to Seventh Street and Fifth and Sixth Streets south into Mission Bay without at-grade crossings of the CalTrain tracks. This alignment option does not include a Mission Bay/Ballpark Station because of the high cost (estimated at approximately $40 million) to provide an underground station.

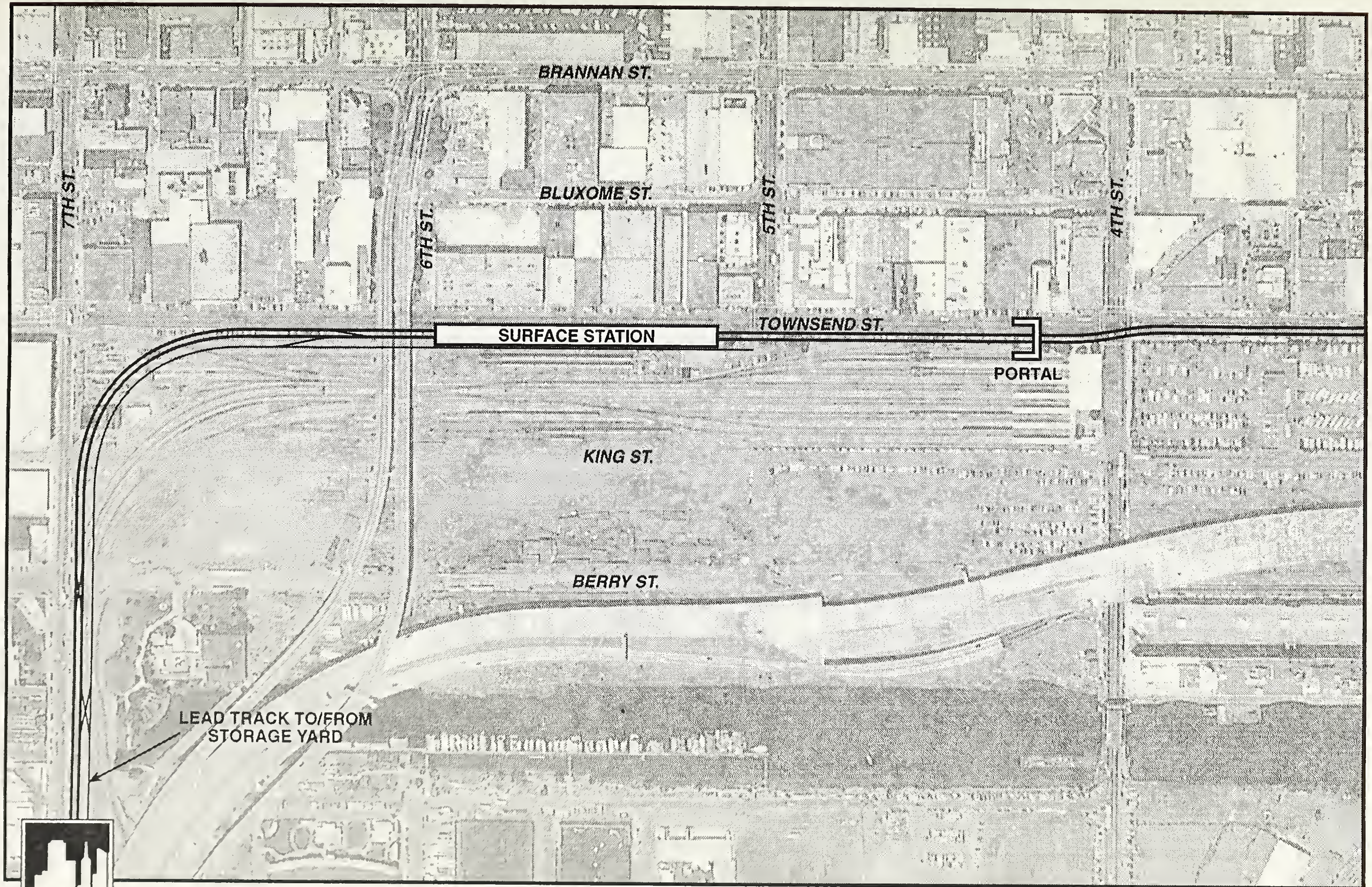

WIDENED TOWNSEND STREET – VARIES: 124' TO 148'-4"
TOWNSEND STREET R/W
82"-6
℄ TRACK
CATELLUS PRPOERTY
VARIES: 15' TO 65'-10"
ALIGNMENT VARIES
8'-4 TO 20'
EXISTING BUILDING LINE
8'
SIDEWALK
12'
PARKING AND BIKE LANES
11'
12'
VARIES 1'-6 TO 10'-2
LANDSCAPE AREA
1'
8'-6
℄ TRACK
18'
ELECTRIFICATION POLE
8'-6
1'
VARIES 1'-6 TO 10'-2
LANDSCAPE AREA
12'
11'
12'
PARKING AND BIKE LANES
8'
SIDEWALK
FENCE
VARIES
EXCAVATION SUPPORT WALL
RETAINED CUT TRANSITION
LOOKING EAST AT FIFTH STREET
0
6
12 Feet
Scale

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

U-WALL CROSS SECTION FOR TOWNSEND-CENTER OPTION

Figure 2.3-3

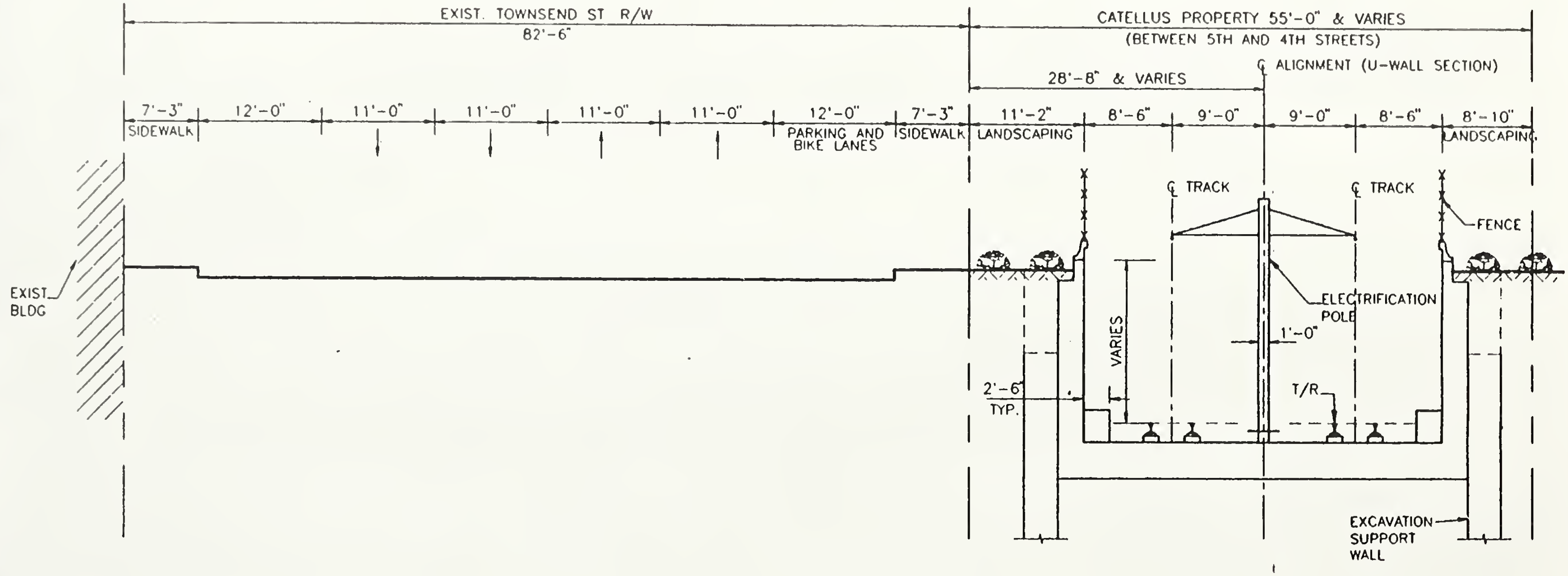

BRANNAN ST.
BLUXOME ST.
7TH ST.
6TH ST.
5TH ST.
4TH ST.
TOWNSEND ST.
SURFACE STATION
PORTAL
KING ST.
BERRY ST.
LEAD TRACK TO/FROM
STORAGE YARD

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TOWNSEND-SOUTH SIDE OPTION

Figure 2.3-4

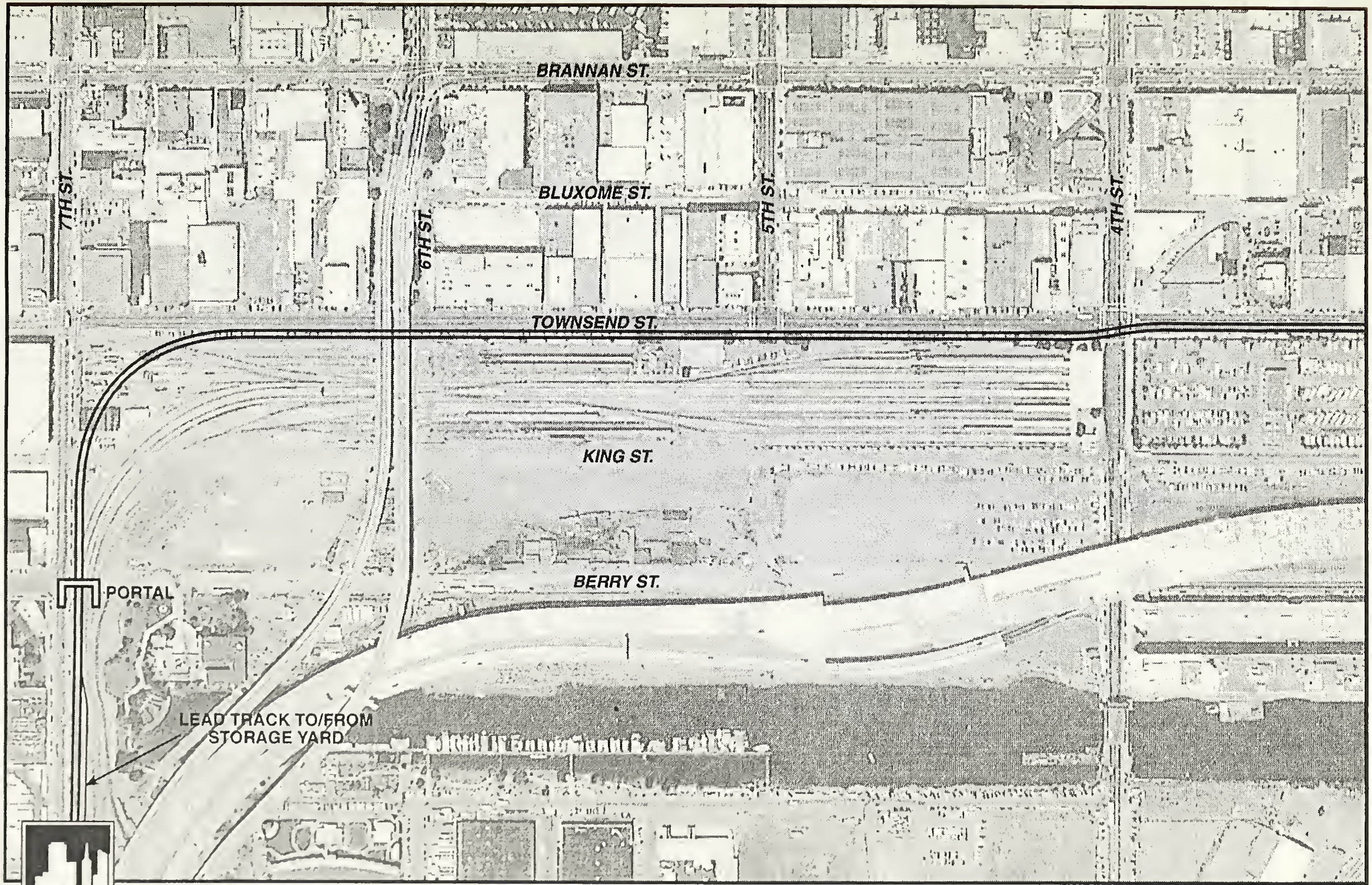

EXIST. TOWNSEND ST R/W
82'-6"
CATELLUS PROPERTY 55'-0" & VARIES
(BETWEEN 5TH AND 4TH STREETS)
℄ ALIGNMENT (U-WALL SECTION)
28'-8" & VARIES
7'-3"
SIDEWALK
12'-0"
11'-0"
11'-0"
11'-0"
11'-0"
12'-0"
PARKING AND BIKE LANES
7'-3"
SIDEWALK
11'-2"
LANDSCAPING
8'-6"
9'-0"
9'-0"
8'-6"
8'-10"
LANDSCAPING
℄ TRACK
℄ TRACK
FENCE
ELECTRIFICATION POLE
1'-0"
VARIES
2'-6" TYP.
T/R
EXCAVATION SUPPORT WALL
EXIST. BLDG

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TOWNSEND-SOUTH SIDE OPTION U-WALL CROSS SECTION

Figure 2.3-5


BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
7TH ST.
6TH ST.
5TH ST.
4TH ST.
PORTAL
LEAD TRACK TO/FROM STORAGE YARD

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TOWNSEND-SOUTH SIDE SUBWAY OPTION

Figure 2.3-6

A summary of the three Townsend Street alignment options is presented in Table 2.3-1

Table 2.3-1
Townsend Street Alignment Options

Options	Townsend-Center	Townsend-South Side	Townsend-South/ Subway
Alignment	Center of Widened Townsend Street	South of Townsend Street	Subway south of Townsend Street
Portal Location	West of Fourth Street	West of Fourth Street	Seventh & Berry Streets
Mission Bay/ Ballpark Station	Yes	Yes	No (would add an estimated $40 million)
Number of Tracks at Mission Bay/ Ballpark Station	2	3	No Station
Estimated Cost	- $1 million	Base Case*	+ $112 million

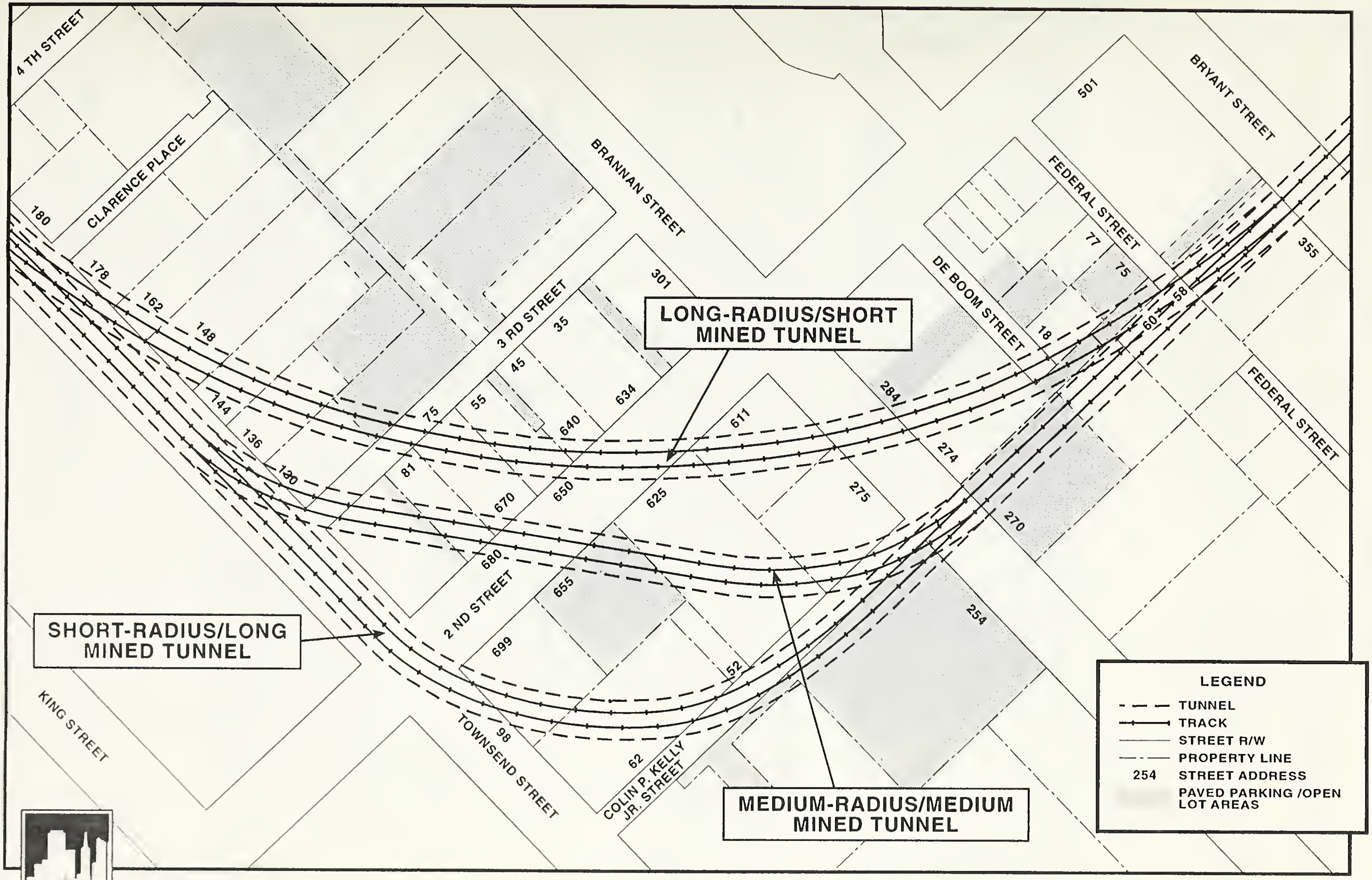
* See Table 2.3-5 and explanatory text in Section 2.3.4.

Source: ICF Kaiser Engineers, September, 1996

Mined Tunnel Segment

A mined tunnel would begin on Townsend Street just west of Third Street and continue east and north under Rincon Hill to just west of Essex and Folsom Streets. This segment of the CalTrain Extension Alternative would be constructed by mined tunnel to reduce construction impacts on the neighborhood and historic structures in the area. As part of the community outreach completed for this project, neighborhood residents asked the JPB to consider mined tunnel techniques rather than cut-and-cover construction in this area. Following this input, the JPB performed extensive technical analyses to develop mined tunnel construction techniques and alignments designed to minimize construction impacts. This section outlines the revised construction techniques and alignments developed in response to community concerns.

Three mined tunnel alignment options are under consideration for this segment and are discussed below: (1) the Short-Radius/Long Mined Tunnel, (2) the Medium-Radius/Medium Mined Tunnel, and (3) the Long-Radius/Short Mined Tunnel. Factors that will influence the selection of the preferred mined tunnel alignment include community and environmental impacts; the quality of underground materials encountered, including groundwater treatment implications; possible construction staging site locations; the number, structural, and historic characteristics of the buildings under which the alignment would travel; and the impacts of the different curve radii and alignment profiles on train operations. Figure 2.3-7 illustrates the mined tunnel alignments under


4 TH STREET
CLARENCE PLACE
BRANNAN STREET
BRYANT STREET
FEDERAL STREET
DE BOOM STREET
FEDERAL STREET
3 RD STREET
2 ND STREET
KING STREET
TOWNSEND STREET
COLIN P. KELLY JR. STREET
LONG-RADIUS/SHORT MINED TUNNEL
MEDIUM-RADIUS/MEDIUM MINED TUNNEL
SHORT-RADIUS/LONG MINED TUNNEL
180
178
162
148
144
136
130
501
77
75
18
58
60
355
301
35
45
55
75
81
634
640
650
670
680
611
625
284
274
275
270
254
655
699
52
62
98
LEGEND
TUNNEL
TRACK
STREET R/W
PROPERTY LINE
254 STREET ADDRESS
PAVED PARKING /OPEN LOT AREAS

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

MINED TUNNEL ALIGNMENT OPTIONS

Figure 2.3-7

consideration and outlines the various properties at the surface. Sections 4.16 and 5.21.13 of this document address the historic characteristics of the properties above these tunnel options. Table 2.3-2 provides basic characteristics of the mined tunnel options.

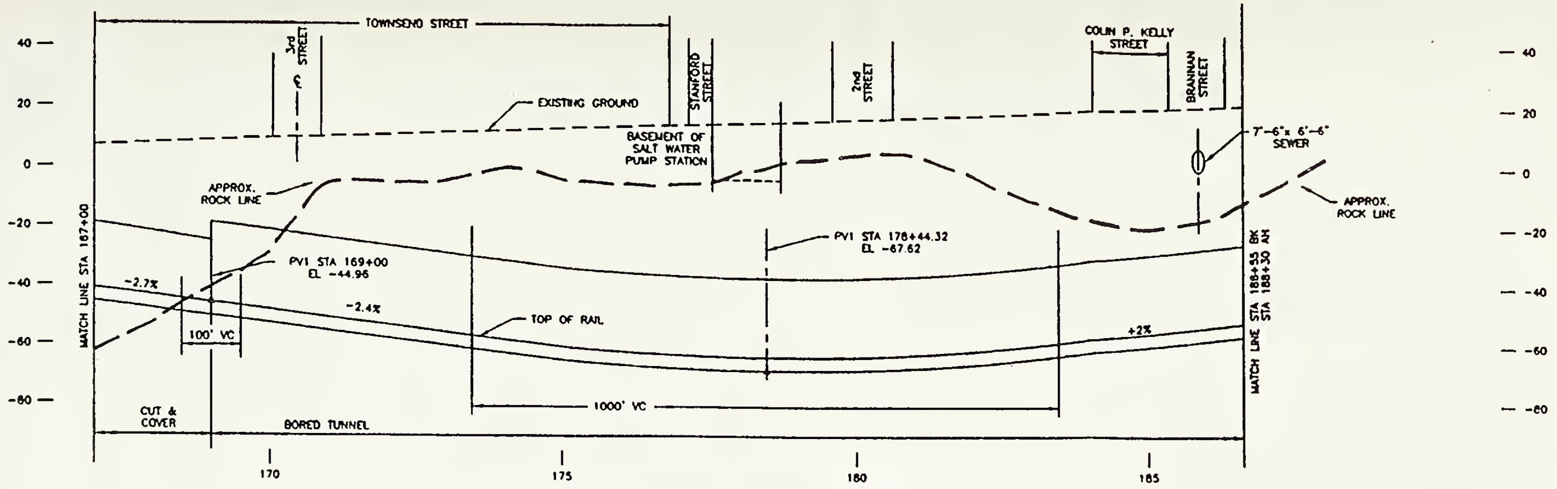
Table 2.3-2
Mined Tunnel Options

Options	Short-Radius/Long Mined Tunnel	Medium-Radius/Medium Mined Tunnel	Long-Radius/Short Mined Tunnel
Distance	2,575 feet	2,400 feet	2,215 feet
Maximum Train Speed	30 mph	20 mph	40 mph
Number of Buildings Passed Under	6	9	16
Estimated Cost	Base Case	- $ 4 million	- $ 6 million

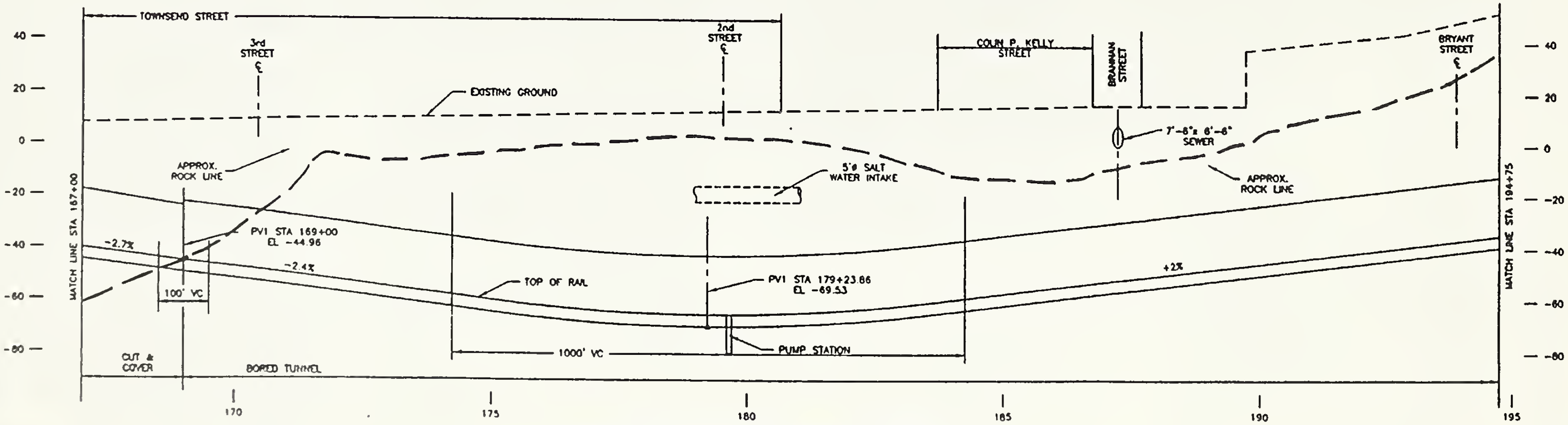
Short-Radius/Long Mined Tunnel Option. The Short-Radius/Long Mined Tunnel alignment option would descend as it proceeds under Townsend Street from Third Street to Second Street. At Second Street, this tunnel would turn northward, passing under Second Street before entering the Colin P. Kelly Street right-of-way. To ensure the structural integrity of buildings under which the tunnel would pass, the tunnel profile would be approximately 40 to 60 feet below the building foundations. (Figure 2.3-8.) The mined tunnel would pass under Brannan Street proceeding northward.

North of Brannan Street, the mined tunnel would continue under the South Beach Billiards building, Bryant Street, the I-80 structure and ramps and to the west of the Essex Street right-of-way. The mined tunnel would end just north of the Essex and Folsom Street intersection. This mined tunnel option would pass under seven buildings on Second, Colin P. Kelly, Brannan, Federal, and Bryant Streets. It may be necessary to demolish the South Beach Billiards building in order to construct a tunnel construction access shaft and a large tunnel ventilation shaft and fan room at this location.

Medium-Radius/Medium Mined Tunnel Option. The Medium-Radius/Medium Mined Tunnel option would descend as it proceeds under Townsend Street between Third Street and Second Street and curves northward at Stanford Street. The tunnel would pass under the San Francisco Fire Department's building at 698 Second Street before entering the Colin P. Kelly Street right-of-way just south of Brannan Street. Figure 2.3-8 shows the profile of this tunneling option. The tunnel would be approximately 40 to 60 feet below the building foundations.


TOWNSEND STREET
3rd STREET ℄
STANFORD STREET
2nd STREET
COLIN P. KELLY STREET
BRANNAN STREET
EXISTING GROUND
BASEMENT OF SALT WATER PUMP STATION
7'-6"x 6'-6" SEWER
APPROX. ROCK LINE
APPROX. ROCK LINE
PVI STA 178+44.32 EL -67.62
PVI STA 169+00 EL -44.96
-2.7%
-2.4%
+2%
100' VC
TOP OF RAIL
1000' VC
CUT & COVER
BORED TUNNEL
MATCH LINE STA 167+00
MATCH LINE STA 188+55 BK STA 188+30 AH
40
20
0
-20
-40
-60
-80
170
175
180
185

PROFILE MEDIUM RADIUS TUNNEL


TOWNSEND STREET
3rd STREET ℄
2nd STREET ℄
COLIN P. KELLY STREET
BRANNAN STREET
BRYANT STREET ℄
EXISTING GROUND
APPROX. ROCK LINE
5'ø SALT WATER INTAKE
7'-8"x 6'-6" SEWER
APPROX. ROCK LINE
PVI STA 169+00 EL -44.96
-2.7%
-2.4%
+2%
100' VC
TOP OF RAIL
PVI STA 179+23.86 EL -69.53
1000' VC
PUMP STATION
CUT & COVER
BORED TUNNEL
MATCH LINE STA 167+00
MATCH LINE STA 194+75
40
20
0
-20
-40
-60
-80
170
175
180
185
190
195

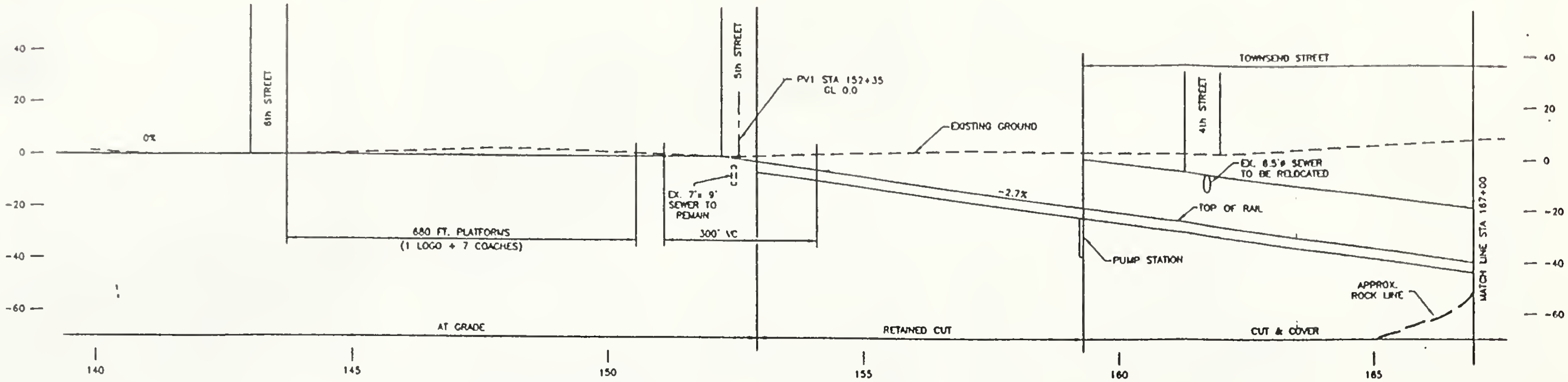
PROFILE SHORT RADIUS TUNNEL

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

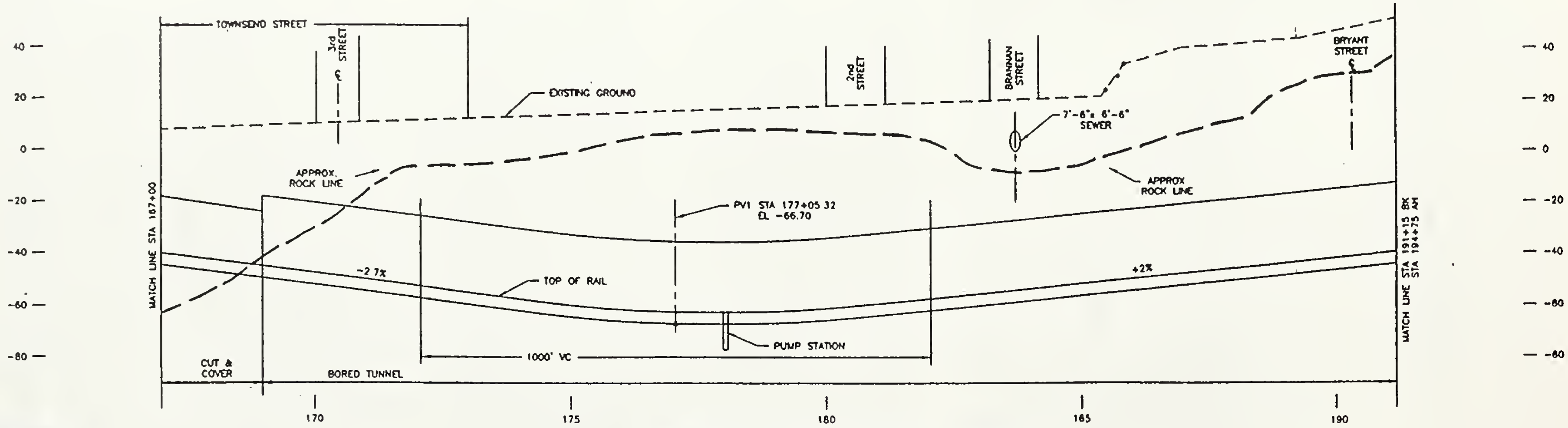
PENINSULA CORRIDOR JOINT POWERS BOARD

MINED TUNNEL PROFILES

Figure 2.3-8a


40
20
0
-20
-40
-60
6th STREET
5th STREET
0%
PVI STA 152+35
GL 0.0
EXISTING GROUND
TOWNSEND STREET
4th STREET
EX. 8.5'ø SEWER
TO BE RELOCATED
EX. 7' x 9'
SEWER TO
REMAIN
-2.7%
TOP OF RAIL
680 FT. PLATFORMS
(1 LOGO + 7 COACHES)
300' VC
PUMP STATION
MATCH LINE STA 167+00
APPROX.
ROCK LINE
AT GRADE
RETAINED CUT
CUT & COVER
140
145
150
155
160
165

PROFILE MATCH SECTION LONG, MEDIUM, & SHORT RADIUS TUNNELS


40
20
0
-20
-40
-60
-80
TOWNSEND STREET
3rd STREET
EXISTING GROUND
2nd STREET
BRANNAN STREET
BRYANT STREET
7'-8" x 6'-6"
SEWER
APPROX.
ROCK LINE
APPROX
ROCK LINE
MATCH LINE STA 167+00
PVI STA 177+05.32
EL -66.70
-2.7%
+2%
TOP OF RAIL
MATCH LINE STA 191+15 BK
STA 194+75 AH
1000' VC
PUMP STATION
CUT &
COVER
BORED TUNNEL
170
175
180
185
190

PROFILE LONG RADIUS TUNNEL

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

MINED TUNNEL PROFILES

Figure 2.3-8b

The Fire Department has an underground salt water intake and pump station located under a portion of its building on Second Street, which is maintained for emergency water supply in the event of disaster. The Medium-Radius/Medium Mined Tunnel alignment would avoid this underground facility.

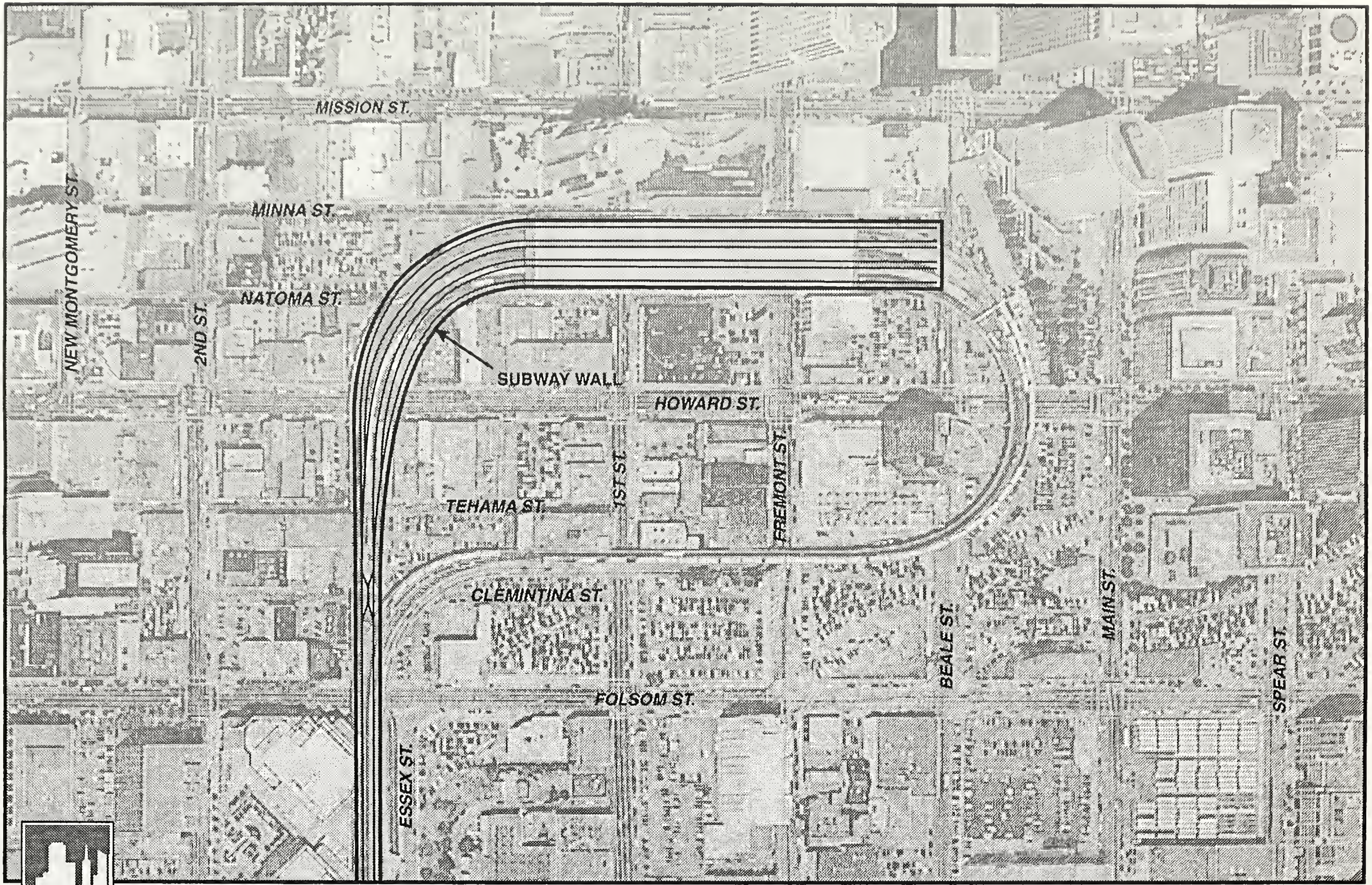
North of Brannan Street, the Medium- and Short-Radius Mined Tunnels would follow the same alignment through Rincon Hill to Essex and Folsom Streets. The medium-radius/medium mined tunnel option would pass under nine buildings on Townsend, Second, Third, Colin P. Kelly, Brannan, Federal, and Bryant Streets. It may be necessary to demolish the South Beach Billiards building in order to construct a tunnel construction access shaft and a large tunnel ventilation shaft and fan room at this location.

Long-Radius/Short Mined Tunnel Option. The Long-Radius/Short Mined Tunnel option would begin curving northward at about Clarence Place just east of Third Street. This mined tunnel would pass under the 18 buildings on Townsend, Second, Third, Brannan, DeBoom, Federal and Bryant Streets. Under this option, the South Beach Billiards site would not be affected, and construction staging sites would be at Fifth and Townsend Streets and Essex and Folsom Streets. The Long-Radius/Short Mined Tunnel would rejoin the alignment of the Short- and Medium-Radius Tunnels at Bryant Street and continue under the I-80 structure and ramps to Essex and Folsom Streets. The profile for this tunnel option is shown in Figure 2.3-8.

Folsom to the Transbay Terminal

Cut-and-Cover Section. Transition from mined tunnel to cut-and-cover subway would occur just north of Folsom Street at Essex Street. This cut-and-cover construction would complete the remaining segment of the proposed CalTrain Extension Alternative underground to the Transbay Terminal site. As shown in Figure 2.3-9, the cut-and-cover construction would follow the right-of-way for the existing outbound bus access ramp that leads from the existing Transbay Terminal to the Bay Bridge. The existing (1996) aerial bus ramp would have to be demolished to allow for construction of the CalTrain Extension subway alignment. Should this ramp be rebuilt as part of the seismic retrofit program currently being undertaken by Caltrans, the new ramp would be designed to remain in service while the subway is constructed. The alignment would turn 90 degrees eastward just after crossing Howard Street and branch from two to six tracks as it enters the Transbay Terminal site.

Underground CalTrain Terminal at the Transbay Terminal Site. The proposed new CalTrain terminal would encompass the footprint of the present Transbay Terminal building plus 13 feet of Natoma Street, which borders the Transbay Terminal on the south, and eight feet of Minna Street, which borders the Transbay Terminal on the north. Six tracks and three center platforms, each 850 feet long and 28 feet wide, would serve CalTrain, with at least two tracks available for future intercity and/or high speed rail service. Each platform would have escalator and stair access to street level. See Figure 2.3-10 for a cut-away view of the possible CalTrain Terminal.

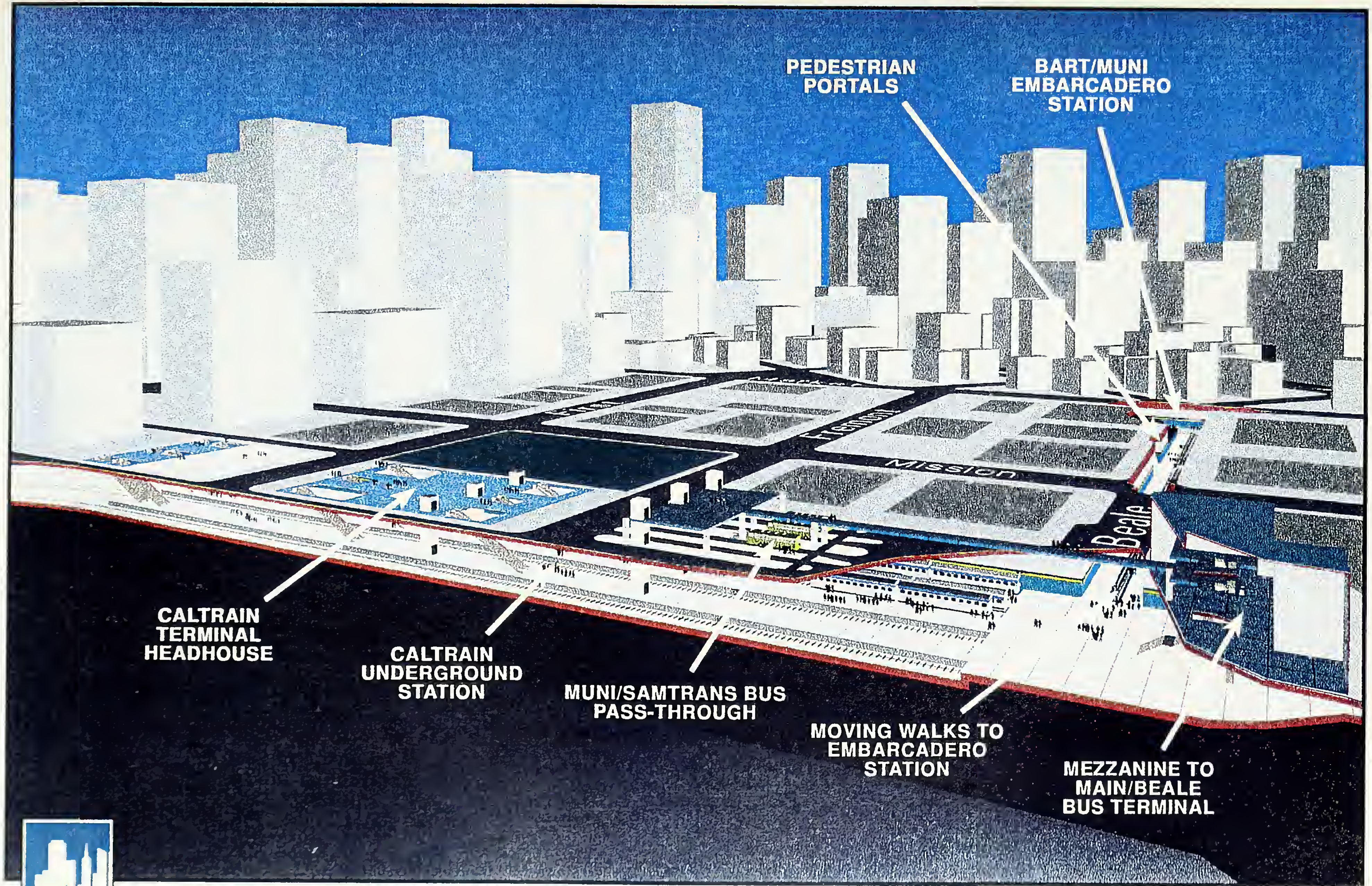

MISSION ST.
MINNA ST.
NATOMA ST.
NEW MONTGOMERY ST.
2ND ST.
SUBWAY WALL
HOWARD ST.
1ST ST.
FREMONT ST.
TEHAMA ST.
CLEMINTINA ST.
BEALE ST.
MAIN ST.
SPEAR ST.
FOLSOM ST.
ESSEX ST.

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

FOLSOM TO TRANSBAY TERMINAL SEGMENT

Figure 2.3-9


PEDESTRIAN PORTALS
BART/MUNI EMBARCADERO STATION
Fremont
Mission
Beale
CALTRAIN TERMINAL HEADHOUSE
CALTRAIN UNDERGROUND STATION
MUNI/SAMTRANS BUS PASS-THROUGH
MOVING WALKS TO EMBARCADERO STATION
MEZZANINE TO MAIN/BEALE BUS TERMINAL

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

CALTRAIN SAN FRANCISCO EXTENSION
MAIN/BEALE BUS ALTERNATIVE

FIGURE 2.3-10

As shown on Figure 2.3-10, the underground terminal could incorporate a pedestrian concourse with moving sidewalks under Beale Street from the new CalTrain terminal to the BART and Muni Metro Embarcadero Station. Muni/SamTrans bus services are proposed to be located: (1) on the surface above the eastern end of the future CalTrain terminal on the block between Fremont and Beale Streets or (2) along a bus mall on Beale Street south of Mission Street with a bus turnaround facility east of Beale Street between Folsom and Howard streets. Structural columns would be designed and positioned between the tracks and on the platforms to support possible future development(s) above the CalTrain terminal, including a possible new bus terminal (see Section 2.4). With the exception of a possible new bus terminal, the type and extent of such development is unknown at this point and would be the subject of future environmental clearance.

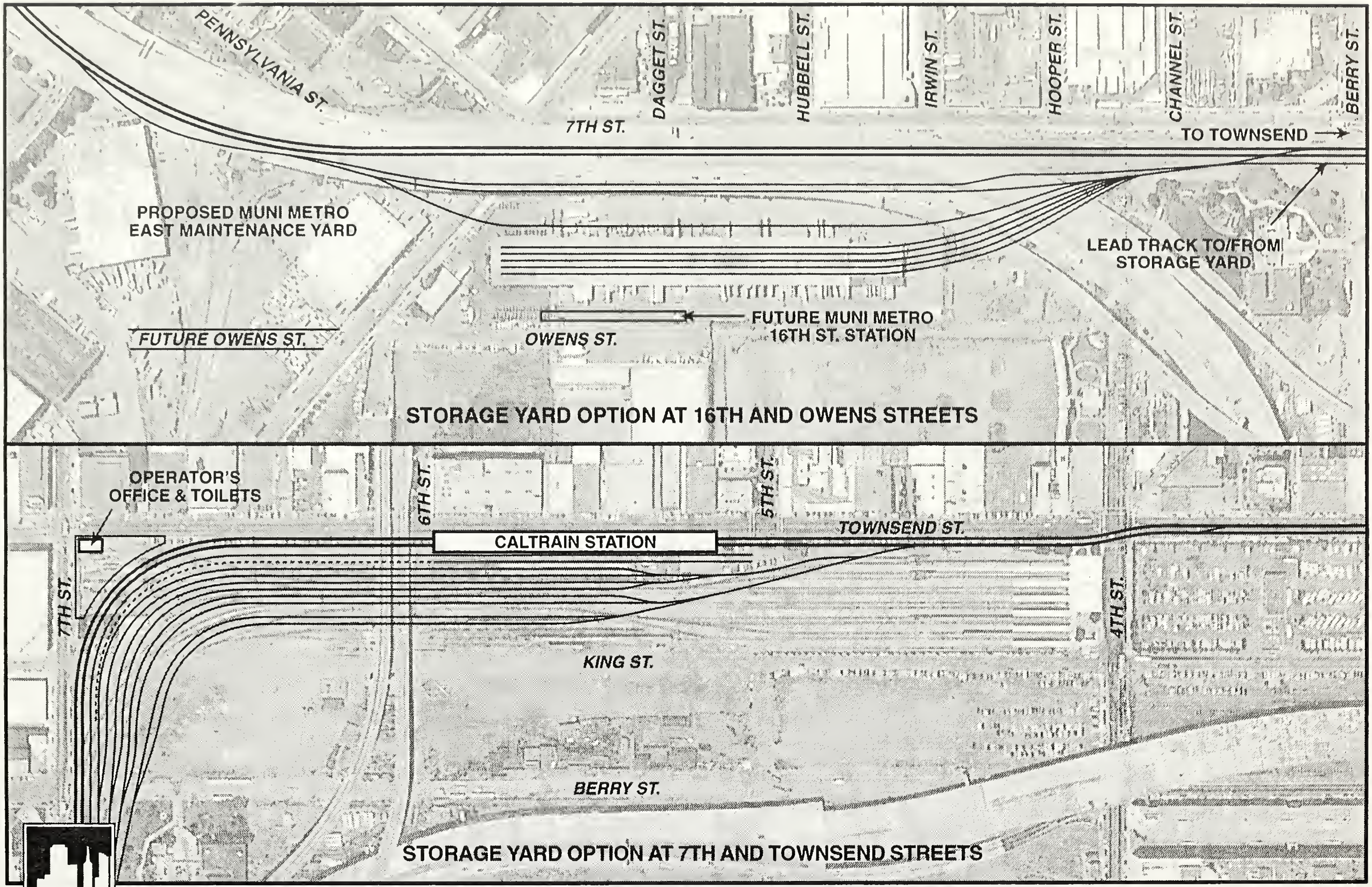
2.3.2 CalTrain Storage Yard Options

A new storage yard is proposed to accommodate layovers and storage for CalTrain trains not needed during the off-peak periods. Two alternative CalTrain storage yard locations are proposed: (1) South of Townsend Street between Fifth and Seventh Streets, and (2) partially under and parallel to the I-280 freeway viaduct west of Owens Street between Hubbell and Sixteenth Streets in Mission Bay (See Figure 2.3-11).

The deadhead time from the new CalTrain terminal to either storage area would be approximately 13 minutes, including train turn-around time. The proposed storage area would have eight 1,000 feet long tracks and lead tracks linking the storage yard with the CalTrain mainline. Table 2.3-3 summarizes characteristics of these yard options.

Table 2.3-3
Storage Yard Options

Options	16th and Owens Streets	7th and Townsend Streets
Capital Cost	Base Case	- $ 1 million
Right-of-way Availability	Purchase from Catellus	JPB holds permanent easement for railroad use
Land Use Considerations	Designated light industrial in Mission Bay Plan	Designated light industrial in Mission Bay Plan
Environmental	Between I-280 freeway and planned housing	Adjacent to and under I-280 freeway ramps; has been rail yard since late 1800s
CalTrain Operational Impacts	Longer deadhead and constrained layout, yielding slightly higher operating costs	Shorter deadhead and double-ended tracks, yielding lower operating costs
Muni/Metro East LRV Maintenance Facility Impacts	Requires re-alignment of planned access tracks, yard layout and possible purchase of additional land for Muni	No impacts


STORAGE YARD OPTION AT 16TH AND OWENS STREETS

STORAGE YARD OPTION AT 7TH AND TOWNSEND STREETS

PENNSYLVANIA ST.
DAGGET ST.
HUBBELL ST.
IRWIN ST.
HOOPER ST.
CHANNEL ST.
BERRY ST.
7TH ST.
TO TOWNSEND →
PROPOSED MUNI METRO EAST MAINTENANCE YARD
LEAD TRACK TO/FROM STORAGE YARD
FUTURE MUNI METRO 16TH ST. STATION
OWENS ST.
FUTURE OWENS ST.
OPERATOR'S OFFICE & TOILETS
6TH ST.
5TH ST.
TOWNSEND ST.
CALTRAIN STATION
7TH ST.
4TH ST.
KING ST.
BERRY ST.

ALTERNATIVE STORAGE YARD LOCATIONS AND CONFIGURATIONS

Figure 2.3-11

2.3.3 Locomotive Propulsion Options

Three locomotive propulsion options are being considered for the CalTrain Extension: (1) dual-mode operation with electric trailer units, (2) dual-mode, new diesel/electric locomotives, and (3) full system electrification. Table 2.3-4 provides basic characteristics of the propulsion options.

Dual-Mode Operation with Electric Trailer Units

For the dual-mode operation with electric trailer propulsion option, diesel locomotives similar to those presently used would power CalTrain from Gilroy to approximately 22nd Street in San Francisco. The propulsion system would then convert to electric mode without stopping prior to entering the underground alignment at the Seventh or Fourth Street portal.

Table 2.3-4
Propulsion Options

Options	Dual-mode, New Diesel/electric Locomotives	Dual-mode with Electric Trailer Units	Full System Electrification
Electrification Type	1,500 V DC	25 KV AC	25 KV AC
Length	San Francisco Terminal to 22nd Street	San Francisco Terminal to 22nd Street	San Francisco Terminal to Gilroy
Capital Cost (millions of 1995 dollars)			
☐ Electric System	$ 17	$ 13	$ 150
☐ Locomotive/ Power Trailers	$ 118	$ 201	$ 129
Total Capital Costs	$ 135	$ 214	$ 279
Annual Operating Costs (millions of 1995 dollars)			
☐ 60 Daily Trains	$ 55.67	$ 57.58	$ 55.62
☐ 86 Daily Trains	$ 68.60	$ 70.99	$ 67.69

To prevent the release of diesel exhaust pollutants in the tunnel or underground terminal, an electric power converter unit, coupled to the diesel locomotive, would provide power for the underground operation into the downtown terminal. Twenty-three electric power trailer units would be required to implement this option.

The electric trailer unit option was initially viewed as a cost savings option, given that new locomotives would not need to be purchased. Under this option, electric trailer units would be built and added to the existing fleet of diesel locomotives. The anticipated opening date for the new CalTrain Terminal of 2005 now suggests, however, that the locomotive currently used for JPB service would be at or near the end of their useful economic lives by the time of project opening and would need to be replaced regardless of the CalTrain Downtown Extension project.

New Dual-Mode Locomotives

For the dual-mode locomotive option, new locomotives that contain both diesel and electric power capability in one unit would replace the existing diesel fleet. Twenty-three new dual-mode locomotives would be required.

For this option, the diesel engine would provide power for operation over the CalTrain system to approximately 22nd Street in San Francisco, and electric power would be used on the remaining portion into the underground CalTrain terminal. New dual-mode locomotives would draw electricity from an overhead catenary system.

It should be noted that the only existing "off-the-shelf" dual-mode locomotives available use low voltage (600-750 Volts) DC power and are not technically compatible with high voltage (25,000 Volts) AC power. It would require a major research and development effort to design and build new dual-mode locomotives capable of operating on 25,000 Volt AC power. For this reason, it is assumed that the CalTrain Downtown Extension would initially be powered using a 1,500-Volt DC overhead power distribution system and that substations would be compatible with available off-the-shelf dual-mode locomotives.

The overhead power distribution system would be designed and built so that it could be easily upgraded to 25,000-Volt AC power for full system electrification in the future. The power substations would have to be replaced, and all of the dual-mode locomotives would have to be replaced with new electric locomotives.

Full System Electrification

The full system electrification option envisions electrification of the entire CalTrain alignment from Gilroy to the new downtown terminal, as well as electrification of the planned new maintenance and storage facility in San Jose or Santa Clara and the proposed train storage yard in San Francisco. Full electrification is assumed to include the following components:

- 25 KV AC traction power system, including five substations and three tie breaker stations;
- Overhead wire system using a supporting side pole arrangement along the tracks and spaced approximately 200 feet apart;
- State-of-the-art communications system; and
- Rehabilitated or new railroad signaling system.

Full system electrification is pollution-free and would result in reduced noise levels produced by the locomotives operating either on the surface or underground. Also, electric locomotives have superior acceleration characteristics to diesel locomotives. The cost of full system electrification, however, would be higher (estimated at an additional $145 million) than purchase of electric trailer units or dual-mode locomotives. Total cost of full system electrification (including costs of electric locomotives) is $254 million.

2.3.4 Capital Costs

Table 2.3-5 presents a summary of capital cost estimates for the CalTrain Extension to the Transbay Terminal Site Alternative. Cost estimates vary depending on alignment options, locomotive propulsion options, fleet vehicle requirements, and right-of-way costs. Estimates are provided for the "base case," which includes the Townsend-South Side Alignment, the short-radius/long mined tunnel, the Sixteenth and Owens Street yard, and the new dual-mode DC locomotive propulsion option. Total capital cost for this base case CalTrain Extension Alternative is estimated to be approximately $656 million in 1995 dollars.

Table 2.3-5
Estimated Capital Costs - CalTrain Downtown Extension
Base Case Cost Estimates -- (Millions of July 1995 Dollars)

Cost Category	Amount [1]
Construction/Procurement	
Right-of-Way for Extension	$ 9.2
Townsend Street Segment (3,935 feet)	39.3
Mined Tunnel Segment (3,900 feet)	86.5
Folsom-Transbay Terminal Segment (990 feet)	39.9
6-Track Underground Terminal (1,035 feet)	85.2
Traction Power, Signaling & Communications	19.9
New Dual Mode Locomotives (23)	101.2
Additional Gallery Passenger Cars (15)	27.0
San Francisco Satellite Storage Yard	9.9
Subtotal Construction/Procurement	418.1
Engineering and Construction Management	75.0
Contingency	87.6
Project Reserve	40.0
Subtotal - San Francisco Downtown Extension Costs	620.7
Park and Ride Lot Expansion at Peninsula Stations [2]	35.5
Total	$656.2

[1] Does not include replacement costs for the Transbay Bus Terminal; Includes full cost of new dual mode locomotives only $24.2 million of which is directly due to the Downtown Extension Project; Includes Townsend-South Side Option; short-radius/long mined tunnel; 16th and Owens Street yard, and dual-mode DC locomotive propulsion.

[2] See Chapter 7 of DEIS/DEIR.

Source: ICF Kaiser Engineers, August 29, 1996.

Capital costs for the longer subway through Mission Bay (Townsend-South/Subway) would be $112 million more (1995 dollars) than the base case. Costs for diesel locomotives with electric power trailers or for full-system electrification would also be greater than the base case by $79 million and $144 million, respectively. Costs would be less than the base case for the medium-radius/medium mined tunnel and the long-radius/short mined tunnel by $4 million and $6 million, respectively. The Townsend at Seventh Street storage yard is estimated to be $1 million less than the storage yard at 16th and Owens assumed in the base case.

The $9.2 million shown for right-of-way costs for the Extension does not include any costs for property currently owned by the California Department of Transportation (Caltrans). Agreements would need to be reached between the public (or private) entities involved regarding the use and/or sale of Caltrans property for both the CalTrain Terminal Station and the development of a mitigation for demolition of the Transbay bus terminal. Rough order-of-magnitude estimates have been made of the values of various affected Caltrans properties, including some $17 million for the Transbay Terminal site (net value after terminal demolition), $4 million for the properties under the west terminal bus ramps, and $23 million for the Main-Beale bus terminal mitigation site (described as Option A in Chapter 6).

Additional negotiations regarding property values and transfers will need to occur among the implementing parties as the CalTrain Extension and bus mitigation options become better defined.

2.3.5 Operating Characteristics and Costs

A railroad operations analysis was performed for this study to determine train, track, and storage requirements. This analysis identified future peak period operating characteristics, which are summarized in Table 2.3-6.

Table 2.3-6
Year 2010 CalTrain Train Fleet Operating Requirements -- CalTrain Extension Alternative

	CURRENT OPERATIONS	YEAR 2010 OPERATIONS
Number of Trains During AM Peak	7 Arriving 4 Departing	10 Arriving 4 Departing
Total Number of Locomotives	20	23
Total Number of Gallery Cars	73	105
Train Consist (number of cars/train)	4 to 5 Gallery Cars with One Locomotive	4 to 7 Gallery Cars with One Locomotive
Passenger Capacity per train	580 to 725	1,015 with 7 Gallery Cars
San Francisco CalTrain Terminal Platform Length	650 Feet	850 Feet

Source: De Leuw, Cather & Company and Corporate Strategies, Inc., CalTrain Operations Analysis Report, September, 1996.

Operating and maintenance costs were compared for the No-Build and CalTrain Extension Alternatives as shown in Table 2.3-7. This table reports operating and maintenance costs for the 60- and 86-train scenarios for both diesel and electric operations. In addition, costs are broken down into two operating segments: 1) the existing route from Gilroy to the Fourth and Townsend Terminal, and 2) the extension to a downtown terminal.

Table 2.3-7
Summary of Annual Operating and Maintenance (O&M) Cost Estimates (1995 dollars)

ALTERNATIVE	GILROY TO 4TH AND TOWNSEND O&M COST ESTIMATES	NEW CALTRAIN TERMINAL O&M COSTS	TOTAL O&M COSTS	INCREMENTAL COSTS FROM NO-BUILD	JPB COST PER TRAIN HOUR
NO-BUILD ALTERNATIVE					
60 Trains	$48,901,000	N/A	$48,901,000	$0	$1,759
86 Trains	$60,630,000	N/A	$60,630,000	$0	$1,555
CALTRAIN EXTENSION					
1. Dual-Mode Operations					
60 Trains	$55,619,000	$1,450,000	$57,118,000	$8,217,000	$1,983
86 Trains	$68,603,000	$1,450,000	$70,053,000	$9,423,000	$1,752
2. Electric Trailer Units					
60 Trains	$57,584,000	$1,450,000	$59,034,000	$10,133,000	$2,050
86 Trains	$70,992,000	$1,450,000	$72,442,000	$11,812,000	$1,812
3. Fully Electric					
60 Trains	$55,619,000	$1,450,000	$57,069,000	$8,168,000	$1,982
86 Trains	$67,692,000	$1,450,000	$69,142,000	$8,512,000	$1,729

Notes:
(1) Costs based on operating statistics defined by ICF Kaiser, Aug-30-95.
(2) Cost estimated for each alternative in 1995 dollars.
(3) Costs for each alternative based on 60- and 86-train scenarios.
(4) Incremental costs relative to No-Build alternative.
(5) Cost Summary tables for each alternative are provided in the Appendix.

Source: ICF Kaiser Engineers, 1996

For the highest train traffic option (86 trains per day), the CalTrain Extension Alternative using dual-mode power is estimated to cost $9.4 million (or 16 percent) more per year to operate and maintain than the No-Build Alternative. Full electric operation would cost approximately $0.9 million less per year than the dual-mode locomotive operations for the 86-train scenario.

Operating costs are expected to increase for the CalTrain Extension Alternative compared to the No-Build Alternative due to two primary factors: 1) all trains would operate about 1.3 miles farther to the new terminal, and 2) trains would not be stored and serviced at the new terminal. Approximately four to six trains would lay over in San Francisco during the midday and at night. Each train laying over in San Francisco would make a round trip from the downtown terminal to the proposed new storage yard.

It should be noted that, under the CalTrain Extension Alternative, anticipated reductions in necessary service for both SamTrans and Muni would result in operating cost reductions for these transit operators. SamTrans would experience estimated reductions of 16,500 annual revenue bus hours and 405,000 annual revenue bus miles, with commensurate reductions in operating costs. Muni would experience an estimated reduction of 15,700 annual revenue-hours and 151,100 revenue-miles under the CalTrain Extension Alternative, again resulting in operating cost savings.

2.4 REPLACEMENT MITIGATION OPTIONS FOR REMOVAL OF THE EXISTING TRANSBAY TERMINAL

Construction of the CalTrain Extension Alternative would require the demolition of the existing Transbay Terminal Building, resulting in impacts particularly to the transit operators and other transportation companies that presently use this facility. Impacts associated with the demolition of the Transbay Terminal are discussed in Chapter 5 of this document.

This document also proposes mitigation in the form of replacement bus facilities; the various bus facility mitigation options are described and discussed in Chapter 6 of this document.

2.5 MITIGATION OPTIONS FOR PARKING DEMAND ALONG THE PENINSULA

The CalTrain Extension Alternative would attract additional CalTrain ridership from along the peninsula. Based on the regional patronage models, this additional ridership will involve an increased demand for parking facilities at specific CalTrain stations. In response to this demand, CalTrain parking lot expansions are proposed and evaluated in Chapter 7 of this document.

2.6 ALTERNATIVES CONSIDERED AND WITHDRAWN

Seven design options were considered for this study and subsequently withdrawn from further consideration based on their engineering feasibility, potential environmental impacts, operational constraints, or other criteria. These alternatives and the reasons they were withdrawn from further consideration are described in the following sections.

In addition to the seven options eliminated as part of this study, many other alternatives have been considered for a CalTrain extension to downtown San Francisco in previous studies completed during the last 20 years (see Section 2.1). For a discussion about alternatives considered in previous studies, please see those studies.

2.6.1 CalTrain Extension to a New Terminal at Market and Beale Streets

Four alignment options applying different construction techniques by segment were considered for an alternative to extend CalTrain to an underground terminal at Market and Beale Streets. Under the first option, the CalTrain Extension would have diverted from the existing CalTrain tracks at about Seventh and Berry Streets, would have traveled along the south side of Townsend Street to a portal at Fourth and Townsend Streets, then beneath Townsend Street to The Embarcadero, curved beneath the southbound lanes of The Embarcadero roadway, and then traveled northward under Beale Street to a proposed underground station between Mission and Market Streets. Cut-and-cover and soft-ground tunneling techniques were investigated to evaluate engineering feasibility and minimize disruptions at the surface. Both a short-tunnel option with a portal between Fourth and Fifth Streets and a long-tunnel option with a portal at Seventh and Berry Streets were considered. Differing alignment options for the final segment entering the underground Market/Beale terminal were also considered based on different proposed terminal configurations.

The second alignment option would have followed the same route from either portal to Third and Townsend Streets using cut-and-cover construction techniques. From this point, the alignment would have descended, curving northeasterly, in a mined tunnel of varying depth sufficient to avoid adverse effects to the structures at the surface. Under Rincon Hill, the top of the tunnel was proposed to be approximately 90 feet below the surface. Under Beale Street, the tunnel would have ascended and continued, using cut-and-cover techniques, to the proposed underground terminal, with alignment variations according to the different terminal configurations.

A third alignment option proposed using the King Street right-of-way rather than Townsend Street for the eastward segment, rejoining the Option One alignment at about Townsend Street and The Embarcadero, and then continuing northeastward in cut-and-cover tunnel subsurface along The Embarcadero right-of-way to Beale Street and thence northward to the underground Market/Beale terminal.

A fourth alignment option for this alternative proposed using the King Street right-of-way subsurface in cut-and-cover tunnel rather than Townsend Street, curving northeasterly east of Fourth Street, transitioning to deep mined tunnel at approximately Third and King Streets, and then continuing to the Market/Beale underground terminal.

Three Market/Beale terminal station configurations were considered for this alternative: 1) a three-level underground station extending all the way to Market Street; 2) a two-level underground station extending in a staggered configuration to Mission and Market Streets; and 3) a two-level underground station extending to Mission Street. The third option included an underground concourse with moving walkways to transport passengers from Mission Street to the Muni/BART Embarcadero Station at Market Street.

Although the CalTrain Extension to a terminal at Market and Beale Streets Alternative had been adopted by the JPB as the Locally Preferred Alternative prior to the initiation of the present study, this alternative was ultimately withdrawn from further consideration. This alternative was rejected because of poor constructability, higher costs, and potentially severe community and environmental impacts along the proposed alignments from Townsend Street to Beale Street.

The alignment options that used cut-and-cover construction down King or Townsend Street and The Embarcadero implied potentially substantial noise and disruption impacts during construction within the South Beach neighborhood and elsewhere along The Embarcadero, areas of extensive residential development that had recently undergone prolonged disruption from construction of The Embarcadero roadway and Muni Metro Extension projects. Moreover, there was potential for adverse impacts on the Bay Bridge anchorage.

The mined tunnel options for this alternative -- which were developed to reduce the disruption from cut-and-cover construction -- were ultimately also rejected. Core borings of the area soils and recorded geological data indicated that the tunnel would have passed through an area of mixed geology, containing highly fractured rock that offered an extremely poor medium for tunneling. A panel of geotechnical and tunneling experts consulted by the study team reviewed these geological data and recommended highly cautious mined tunneling techniques if this alignment were pursued. In general, however, the expert panel recommended against this tunneling alignment, given the high potential for rock slippage and catastrophic events such as cave-ins and broken utility lines. A variety of mined tunnel alignments was explored to identify a more readily constructable northerly route from Townsend or King Streets to Beale Street, but all shared similarly poor subsurface materials.

Moreover, extending the line north of Mission Street all the way to Market Street would have been extremely costly, given that two stacked train levels would have been needed, resulting in a very deep excavation between older, historic buildings, and given the existence of subsurface parking structures extending into part of the Beale Street right-of-way. Similarly, expanding the proposed CalTrain terminal to six tracks to accommodate future high-speed rail would have cost more at the Market/Beale Street location than at the Transbay Terminal site. Because of the additional costs for this alternative compared with the Transbay Terminal Alternative, the problems associated with both the mined tunnel and cut-and-cover alignment segments, and the major issues at the proposed terminal site, the CalTrain Extension Alternative to the Market and Beale Street Terminal was withdrawn from further consideration.

2.6.2 King Street Alignment Options

This alignment suboption would have followed King Street rather than Townsend Street for the first segment of the CalTrain Extension from about Seventh and Berry Streets to The

Embarcadero. Alternative portal locations at Seventh Street/Berry Street and Fifth Street/King Street were incorporated. The King Street alignment portion was capable of being combined with the remaining portions of any of the Transbay Terminal or Market and Beale Street terminal alignments.

The King Street alignment segment was withdrawn from consideration because it would have caused severe traffic disruptions during construction. Moreover, construction of this alignment would have meant tearing up the newly constructed southbound lanes of King Street and would have been complicated by a very large trunk sewer line located adjacent to the proposed CalTrain alignment.

2.6.3 Brannan Street Alignment Options

This alignment suboption would have followed Brannan Street rather than Townsend Street or King Street for the first segment of the CalTrain Extension from about Seventh and Berry Streets to The Embarcadero. The Brannan Street alignment portion was capable of being combined with the remaining portions of any of the Transbay Terminal or Market and Beale Street terminal alignments. It was withdrawn from further consideration for a number of technical and environmental reasons. The alignment would have passed on the surface in front of the Sixth Street off Ramp for I-280 and would have traveled along the densely developed Brannan Street. Moreover, strong public objections were voiced regarding this alignment early in the process.

2.6.4 CalTrain Aerial Terminal at the Transbay Terminal Site

This design option envisioned an aerial CalTrain terminal on the second level of the Transbay Terminal site, with a provision for a mezzanine and bus facility on top of the CalTrain station. This station configuration involved several serious impacts that would not occur if the station were underground. First, the new ramps to the aerial facility would have required permanent closure of Clementina and Tehama Streets between First and Second Streets to through traffic. Second, the trains would have been on aerial ramps as they made the sharp curve into the terminal, leading to probable long-term adverse noise impacts. Third, structural changes would have been needed to accommodate the trains and to comply with current seismic and building codes. With the necessary addition of new shear walls in the underground parking area and in the passenger/retail spaces above, the current terminal functions would have been severely impaired.

Finally, if a bus facility were to have been placed on top of an aerial CalTrain station, the structure would have measured about 100 feet high and 1,350 feet long, creating an adverse visual barrier. Moreover, additional aerial ramps would have been needed to provide bus access to the upper level. For these numerous reasons, the aerial CalTrain station was withdrawn from further consideration.

2.6.5 Propulsion Options Using Clean Diesel or Liquefied Natural Gas Fuels

"Clean" diesel and liquefied natural gas (LNG) fuels were the least expensive of the train propulsion options considered. The "clean" diesel option was rejected because it would have produced the largest amounts of air pollution emissions in the tunnel and terminal area, including: nitrogen oxides, carbon monoxide, formaldehyde, and particulate matter. Also, ventilating pollutant emissions from these areas would have required numerous ventilation shafts breeching the surface and extending into smoke stacks of varied height along the alignment.

The conversion of CalTrain locomotives to LNG fuel would have substantially reduced pollutant emissions, reducing the number of ventilation shafts needed. Additional fueling facilities would have been required because the trains would have needed more frequent refueling. The San Francisco Fire Department expressed strong reservations about the fire safety aspects of operating LNG locomotives in an underground environment, and indicated that it would not allow this type of operation. Therefore, this option was withdrawn from further consideration in favor of the various remaining propulsion options.

2.6.6 CalTrain Storage Yard Located in Brisbane

An alternative to the Mission Bay locations proposed for a CalTrain midday storage and layover yard was a site at the former Bayshore railroad yard in Brisbane. This potential yard site was withdrawn from further consideration because of its distance from the proposed new CalTrain terminal. "Deadhead" time (the amount of time the train would be operated out of revenue service) would have been three and one-half times greater than the time to either of the proposed sites in Mission Bay, adding substantially to CalTrain operating costs.

CHAPTER 3: TRANSPORTATION ANALYSIS

This chapter describes existing and projected future transportation conditions in the project area. It includes the following four sections: 1) transit, 2) vehicular traffic, 3) non-motorized traffic, and 4) parking. The transit section describes current and future rail and bus services and patronage. The vehicular traffic section describes the existing and future street and highway system in the corridor. The non-motorized traffic section focuses on existing pedestrian/bicycle traffic patterns, and future pedestrian walkways, bike paths, and attractors. The parking section describes existing parking amounts, locations, accessibility, and future needs.

3.1 TRANSIT

3.1.1 Existing Rail Transit Services

The information in this section provides a baseline to assess the level of impact to existing rail transit services for each of the project alternatives (in Chapter 5). Although this document focuses on CalTrain service, other rail transit systems, including the Bay Area Rapid Transit (BART) District and the San Francisco Municipal Railway (Muni), serve the area surrounding the Transbay Terminal and the existing CalTrain terminal. Descriptions of these systems are included. Table 3.1-1 summarizes key operational characteristics of rail services in the project area. Figure 2.2-1 illustrates the location of the rail services in the immediate project area as well as several waterfront transportation projects.

CalTrain

CalTrain provides commuter rail service from Santa Clara County to San Francisco. Service is operated by the Peninsula Corridor Joint Powers Board (JPB), a joint powers agency consisting of San Francisco, San Mateo, and Santa Clara Counties. The 77-mile rail line serves 34 stations. The San Francisco terminal is located at Fourth and Townsend Streets, approximately 1.3 miles from the downtown core. The southern terminal is in Gilroy. On the weekends and during non-peak hours, the southern terminal is the Tamien station in San Jose, which provides a connection with the Santa Clara County light rail system. Figure 1.2-1 schematically shows the location of the CalTrain stations.

CalTrain currently operates 60 trains each weekday with a combination of express and local train service. Weekday service hours are from 5:00 a.m. to 11:30 p.m., except for a midnight train leaving San Francisco on Friday and Saturday. Saturday service operates from 6:00 A.m. to 1:30 a.m. Sunday service operates from 8:00 a.m. to 11:30 p.m.

Table 3.1-1
Existing Rail Transit Service in the Study Area

Rail Transit Provider/ Line	Typical Weekday Hours of Operation	Typical Headway in Minutes					Fare Structure
		Weekday			Sat.	Sun.	
		Peak	Base	Eve	Base	Base	
CalTrain	5 a.m. - 11:30 p.m.	5 - 30	60	5-30	60	120	Zone
BART							
● Pittsburg - Colma	4 a.m. - 12 a.m.	5 - 10	15	20	20	20	Zone
● Fremont-Daly City		10	15	---	20	---	
● Richmond-Colma/ Daly City		15	15	---	20	---	
● Richmond-Fremont		15	15	20	20	20	
Muni Metro							
● J-Church	5 a.m.-12:30 a.m.	5	10	12	15	15	Flat
● K-Ingleside		10	10	12	12	15	
● L-Taraval		5	10	12	10	12	
● M-Ocean View		10	10	12	12	15	
● N-Judah		5	10	12	8	10	

Source: Published schedules.

Frequencies during the peak periods vary widely; peak headways are between 5 and 30 minutes. During the midday and evenings, trains run every 60 minutes. On the weekends, trains run every 60 to 120 minutes (1 to 2 hours).

Weekday CalTrain ridership in February 1996 is estimated at 22,200 passengers, and over half of these riders pass through the current CalTrain terminus at Fourth and Townsend streets.[1] Over half (some 5,500) of the approximately 11,000 morning riders exit at the terminus station; and, correspondingly, over half of the riders board the train at the terminus in the evening. Since February, ridership has increased to nearly 24,000.[2]

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[1] CalTrain February/March 1996 Ridership Survey.

[2] *CalTrain Performance Report*, 1996

Bay Area Rapid Transit (BART)

BART provides heavy rail passenger service in the metropolitan Bay Area. BART currently operates four lines: Pittsburg-Colma, Fremont-San Francisco/Daly City, Richmond-Colma/Daly City, and Fremont-Richmond. All lines except the Fremont-Richmond line serve downtown San Francisco directly via a subway beneath Market Street (Figure 2.2-1).

BART hours of service are Monday through Friday from approximately 4:00 a.m. to 12:00 a.m., Saturday from 6:00 a.m. to about 12:00 a.m., and Sunday from 8:00 a.m. to 12:00 a.m. BART operates direct service Monday through Sunday between Pittsburg and Colma and also between Fremont and Richmond during all service hours. At night and all day Sunday, only these two routes operate, requiring passengers to transfer if their destination is on a line that is not directly connected. Table 3.1-1 summarizes the frequency of BART trains.

BART shares four stations in downtown San Francisco with Muni Metro: Embarcadero, Montgomery, Powell, and Civic Center. Other BART stations in San Francisco are: 16th Street, 24th Street, Glen Park, and Balboa Park. There is currently no direct transfer connection between CalTrain and BART. Connections between CalTrain and BART are by Muni bus transfer to or from the BART Powell, Montgomery, or Embarcadero Stations.

Recent BART ridership counts (August 1995) show weekday ridership of 251,000 passengers per day. Most passenger activity occurs in downtown San Francisco at the Embarcadero, Montgomery, Powell, and Civic Center stations. Weekday activity at these stations in 1995 was about 169,500 boardings, over two-thirds of system's total activity. The Embarcadero station had the highest number of boardings, with weekday activity of 53,500. The number of weekday BART transbay trips was about 121,900 in 1995, constituting about 49 percent of all BART trips. About 65,000 passengers (26 percent) use BART solely within San Francisco or for travel between San Francisco and San Mateo County (Colma or Daly City Station).

Muni Metro

Muni operates the Muni Metro light rail system. Muni currently has five operating lines: J-Church, K-Ingleside, L-Taraval, M-Ocean View, and N-Judah. Figure 2.2-1 shows the five shared subway stations of these five lines. For the most part, the system operates in mixed traffic except for the subway sections and small sections of exclusive at-grade right-of-way.

Muni Metro lines operate from 5:00 a.m. to 12:30 a.m. on weekdays, from 6:00 a.m. to 12:30 a.m. on Saturday, and from 8:00 a.m. to 12:30 a.m. on Sunday. Weekday headways vary between five and 12 minutes, depending upon the line and the time of day (Table 3.1-1). Metro Owl service, late-night surface bus service, is offered for portions of various lines.

All five lines operate in the Market Street subway through downtown San Francisco. Muni Metro shares four stations with BART in this segment: Embarcadero, Montgomery, Powell, and Civic

Center. The J, K, and M lines also have a connection with BART at Balboa Park, while the J line serves the Glen Park BART station with a surface connection. There is currently no direct transfer connection between CalTrain and Muni Metro.

Since September 1995, Muni has also operated an historic streetcar line (F-Line) on Market Street from Castro Street to the Transbay Terminal. A extension of the F Line along the Embarcadero to the Fisherman's Wharf area is currently under construction and is projected to open in 1998-99.

Weekday Muni Metro ridership in 1995 was 121,575 boardings. Table 3.1-3 shows the 1995 weekday boardings for each of the Muni Metro lines. The N-Judah line had the highest number of weekday boardings, approximately 37,400 in 1995. The J-Church line had the fewest boardings, 15,100 in 1995.

Table 3.1-3
1993 Muni Metro Weekday Ridership

Muni Metro Line	Weekday Ridership
J - Church	15,100
K - Ingleside	18,400
L - Taraval	26,850
M - Ocean View	23,825
N - Judah	37,400
Total Muni Metro Ridership	121,575

Source: Section 15 Ridership Statistics, FY 1995/96, San Francisco Municipal Railway. Short Range Transit Plan 1996-2003, Appendix A (September, 1996).

3.1.2 Existing Bus Service

This section describes existing bus transit service in the project area and serving CalTrain stations outside the project area. Transit service in three basic geographic areas is described for all appropriate transit operations: Downtown San Francisco (including the Transbay and Ferry Terminals), the existing CalTrain terminal (Fourth and Townsend Streets), and Peninsula CalTrain stations.

Four public transit operators provide bus service to downtown San Francisco: Muni, SamTrans, AC Transit, and Golden Gate Transit. In addition, Greyhound and Amtrak have bus terminals in San Francisco. The Transbay Terminal and the Ferry Terminal are the two transit hubs in downtown San Francisco. The Ferry Terminal at the eastern end of Market Street near The Embarcadero is served by two transit agencies as well as a number of ferry services. The existing CalTrain Terminal is served only by Muni and Amtrak bus service. Figure 3.1-1 shows transit service at the Transbay Terminal and in the CalTrain station area.

The Peninsula CalTrain stations have feeder bus service provided by Muni, SamTrans, and the Santa Clara Valley Transportation Authority. Table 3.1-4 shows the connecting bus routes at each of the 34 CalTrain stations.

Muni

Virtually every resident of San Francisco is within one-quarter mile of a Muni bus line. The system has 74 coach (including motor coach and electric trolley bus) routes, five light rail routes, the F-line Streetcar, and three cable car routes. Over 50 percent of all San Franciscans who both live and work in San Francisco use public transit to gain access to their work sites, and the vast majority do so on Muni.

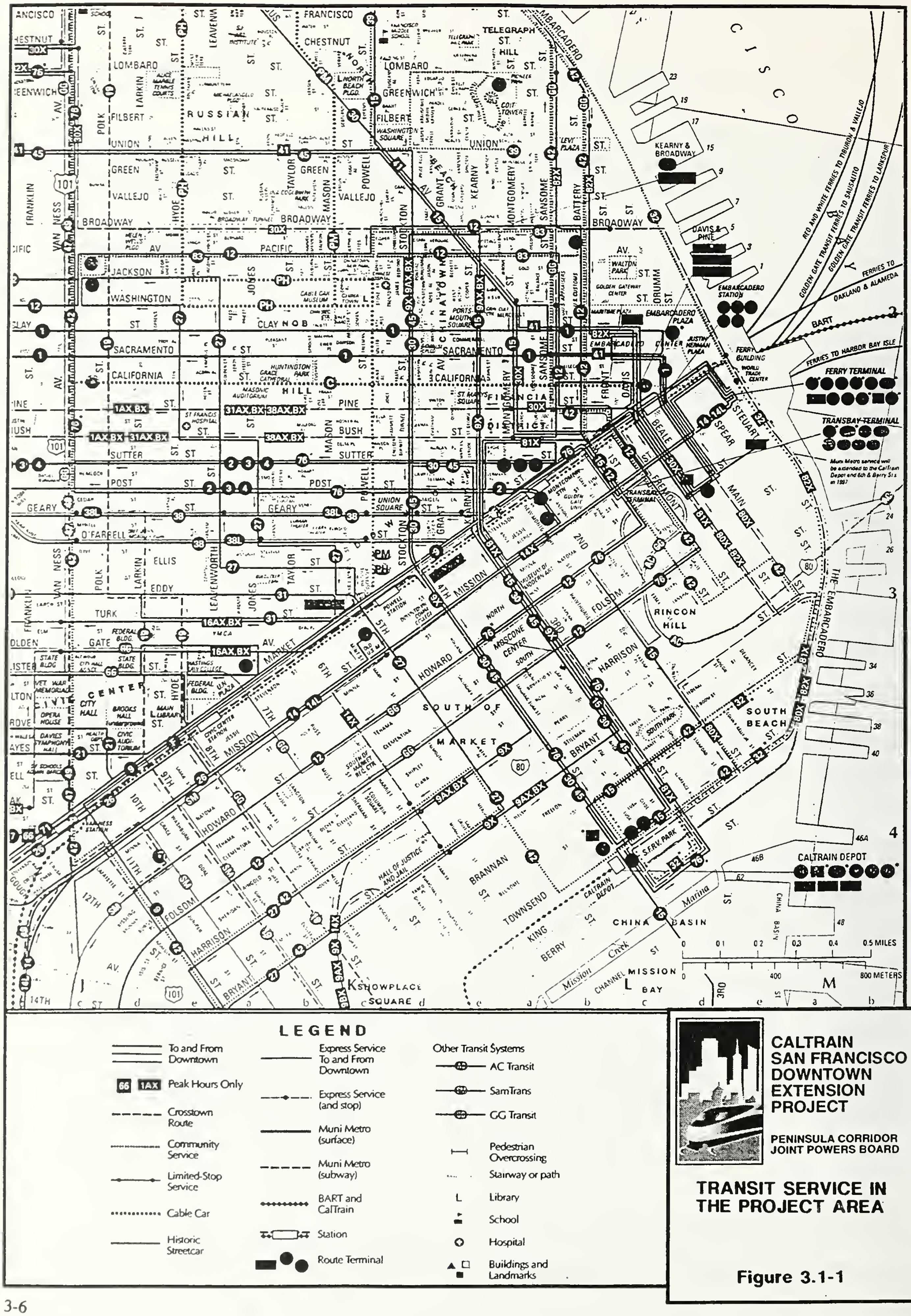
Muni service is offered seven days a week on most routes. Regular operating hours are 6:00 a.m. to midnight. A skeleton service, consisting of 13 routes, provides limited late night service from midnight to 6:00 a.m. Express and local service is provided each weekday in many corridors. Frequencies during the peak periods are typically five to 15 minutes on all routes. Off-peak frequencies range from five to 20 minutes, depending on demand and headway policy.

Muni is currently the only operator serving the existing CalTrain terminal. Nine lines serve the station at Fourth and Townsend, as follows:

15 - Third. This route is a primary trunk line operating between City College, downtown San Francisco, Chinatown, North Beach, and Fisherman's Wharf on Third Street, Kearny Street, and Columbus Avenue. It is the primary route serving the Bayshore area. The route crosses Market Street between the Montgomery and Embarcadero stations and provides access there to the BART and Muni Metro systems.

30 - Stockton. This route provides service between the CalTrain station, downtown San Francisco, Chinatown, North Beach, Fisherman's Wharf, and the Marina District via Stockton, Columbus, North Point, and Chestnut. The route provides access to BART and Muni Metro as it crosses Market Street between the Montgomery and Powell stations.

32 - Embarcadero. This route provides service between the CalTrain station, the Ferry Building, Fisherman's Wharf, and the Hyde Street Pier via The Embarcadero. The loop is bi-directional with service from 6:00 a.m. to 9:00 a.m. and from 3:30 p.m. to 6:00 p.m. over the entire route. Except on weekends and holidays, no service is provided to the CalTrain station between 9:00 a.m. and 3:30 p.m., with the route turning back at the Ferry Building. With the extension of the Muni Metro to Fourth and King Streets, Muni will eliminate service on the 32-Embarcadero.


LEGEND
To and From Downtown
66 1AX Peak Hours Only
Crosstown Route
Community Service
Limited-Stop Service
Cable Car
Historic Streetcar
Express Service To and From Downtown
Express Service (and stop)
Muni Metro (surface)
Muni Metro (subway)
BART and CalTrain
Station
Route Terminal
Other Transit Systems
AC Transit
SamTrans
GG Transit
Pedestrian Overcrossing
Stairway or path
Library
School
Hospital
Buildings and Landmarks
FERRY TERMINAL
TRANSBAY TERMINAL
CALTRAIN DEPOT
EMBARCADERO STATION
FERRY BUILDING
Muni Metro service will be extended to the CalTrain Depot and 6th & Berry Sts in 1997
RED AND WHITE FERRIES TO TIBURON & VALLEJO
GOLDEN GATE TRANSIT FERRIES TO SAUSALITO
GOLDEN GATE TRANSIT FERRIES TO LARKSPUR
FERRIES TO OAKLAND & ALAMEDA
FERRIES TO HARBOR BAY ISLE
BART
SOUTH OF MARKET
SOUTH BEACH
RINCON HILL
CHINA BASIN
MISSION BAY
RUSSIAN HILL
NOB HILL
TELEGRAPH HILL
CIVIC CENTER
CHINATOWN
FINANCIAL DISTRICT
MOSCONE CENTER
UNION SQUARE
SHOWPLACE SQUARE
THE EMBARCADERO
0 0.1 0.2 0.3 0.4 0.5 MILES
0 400 800 METERS

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TRANSIT SERVICE IN THE PROJECT AREA

Figure 3.1-1

Table 3.1-4
Bus Connections at CalTrain Stations

CalTrain Station	Feeder Bus Service
4th/Townsend	Muni 15, 30, 32, 42, 45, 76, 80X, 81X, 82X
22nd Street	Muni 48
Paul Avenue	Muni 29
Bayshore	[1]
South San Francisco	SamTrans 7B, 22D, 24B, 26H, 28C
San Bruno	SamTrans 5L, 5M, 32P
Millbrae	SamTrans 5L, 5M, 19F, 33B, 33C, 33D
Broadway	SamTrans 7B, 34D
Burlingame	SamTrans 5L, 5M, 7B, 19F, 34D, 43G
San Mateo	SamTrans 7B, 18F, 43A, 43G, 43N, 90H
Hayward Park	None
Bay Meadows	SamTrans 43G
Hillsdale	SamTrans 4A,5L,5M,7B,19F,40E,43G,43N,44A,44B,90E,90H
Belmont	SamTrans 5L, 5M,7B, 7F, 18F, 40E, 40R, 45B
San Carlos	SamTrans 5L,5M,7B,7F,16F,18F,46B,46C,51S
Redwood City	SamTrans 5L,5M,6A,7B,7F,16F,17F,51B,51C,51R,51S
Atherton	SamTrans 5L,7F
Menlo Park	SamTrans 5L, 6A, 7F, 50B; SCVTA 22
Palo Alto	SamTrans 5L,5M,50A,50C,50V; SCVTA 22,35,86,300
California Avenue	SCVTA 23A,88,101,104,182,503; Dumbarton Exp.
Castro	SCVTA 20, 34 40, 50, 140, 304
Mountain View	SCVTA 20, 50, 51, 52, 140, 145, 304, 304A
Sunnyvale	SCVTA 26, 32, 53, 54, 55, 56
Lawrence	SCVTA 32, 41, 42, 43, 126, 145
Santa Clara	SCVTA 10, 22, 32, 34, 44, 60, 81, 87, 300
College Park	SCVTA 36, 62, 304
San Jose	SCVTA 63, 64, 65, 68, 180
Tamien (Light Rail)	SCVTA 67, 82
Capitol	None
Blossom Hill	SCVTA 27, 67, 68, 160
Morgan Hill	SCVTA 15, 68, 160, 521
San Martin	None
Gilroy	SCVTA 17, 68, 160, 521

Note [1]: Bayshore CalTrain station in San Francisco is not directly served by Muni. Muni lines 15-Third and 56 Rutland provide service within 1/4 mile of the CalTrain station.

SCVTA = Santa Clara Valley Transportation Authority

42 - Downtown Loop. This loop route connects the CalTrain station, Transbay Terminal, Financial District, Fisherman's Wharf, and the Civic Center. The loop is bi-directional and provides access to all of the major regional transit providers.

45 - Union-Stockton. This route operates between the CalTrain station, downtown San Francisco, Chinatown, and the Presidio via Stockton and Union Streets. The route provides access to BART and Muni Metro as it crosses Market Street between the Montgomery and Powell stations.

76 - Marin Headlands. This recreational route operates only on Sundays and some holidays. It operates between the CalTrain station, downtown San Francisco, the Marina District, the Presidio, and Marin Headlands via Sutter, Van Ness, Lombard, Doyle Drive, and the Golden Gate Bridge.

80X - Gateway Express, 81X - CalTrain Express, and 82X - Levi Plaza Express. These express routes operate during the weekday peak periods only. The routes provide direct service to employment and residential centers in downtown San Francisco, the Financial District, the Gateway complex, and Levi Plaza. With the extension of the Muni Metro to Fourth and King Streets, Muni will restructure the 80X, 81X and 82X routes.

Table 3.1-5 shows the operational characteristics and ridership of each of these bus lines. Muni also provides service to two other CalTrain stations in San Francisco. The 48-Quintara-24th Street serves the 22nd Street Station, and the 29-Sunset serves the Paul Avenue Station.

Table 3.1-5
Existing Muni Bus Service to/from Fourth and Townsend CalTrain Station

Muni Bus Line	Typical Weekday Hours of Operation	Typical Headway in Minutes					Average Weekday Route Boardings and Alightings	Weekday Boardings and Alightings at 4th and Townsend
		Weekday			Sat.	Sun.		
		Peak	Base	Eve	Eve	Base		
15	5:30 a.m. - midnight	5	10	15	10	10	25,650	1,450
30	5:30 a.m. - 1:00 a.m.	6	6	20	6	5	25,260	2,930
32	6:00 a.m. - 6:00 p.m.	15	15	---	20	20	1,090	260
42	6:00 a.m. - 12:30 a.m.	9	12	20	20	20	15,090	1,500
45	6:00 a.m. - 1:00 a.m.	7	6	20	12	15	17,060	2,230
76	N/A [1]					60	N/A	N/A
80X	Commute Peak	10					1,940	1,940
81X	Commute Peak	10					1,450	1,450
82X	Commute Peak	10					460	460
RIDERSHIP TOTALS							88,000	12,220

[1] Sunday Only -- 9:30 a.m. - 6:30 p.m.

Sources: Published Transit Agency Schedules, San Francisco Municipal Railway, Short Range Transit Plan 1996-2003, Appendix A (September 1996), San Francisco Municipal Railway, Ridership Profiles dated 1990-1995; San Francisco Municipal Railway, Section 15 ridership statistics, FY 1995-96.

Muni has nine bus lines and streetcar service that serve the Transbay Terminal: 5-Fulton, 12-Folsom, 14-Mission, 14L-Mission Limited, 15-Third Street, 38-Geary, 38L-Geary Limited, 42-Downtown Loop, 76-Marina Headlands and the F-Line Streetcar. The 38-Geary and 5-Fulton provide-24-hour service. Table 3.1-6 shows the operational characteristics of the bus routes serving the Transbay Terminal.

SamTrans

SamTrans provides bus service throughout San Mateo County with connections to the Colma, Daly City, and Hayward BART stations, the San Francisco International Airport, and downtown San Francisco. SamTrans also provides feeder service to fourteen CalTrain stations along the Peninsula. Table 3.1-4 lists the SamTrans bus connections at CalTrain stations in San Mateo County. SamTrans does not serve the existing CalTrain Terminal at Fourth and Townsend Streets.

Nine of the SamTrans bus routes to downtown San Francisco terminate at the Transbay Terminal. Seven of these routes have limited, peak-only commuter service. Table 3.1-6 describes the general operating characteristics of these routes, which are depicted in Figure 3.1-1. SamTrans also provides service from San Mateo County to the San Francisco Civic Center. Two commuter bus routes serve this area: Route 2S from San Bruno and Route 19F from San Mateo.

AC Transit

AC Transit provides service in western Alameda County and western Contra Costa County. The East Bay transit operator has 130 bus routes providing local, express, and commuter service within its service area and to downtown San Francisco.

As indicated by Figure 3.1-1, the only location in San Francisco served by AC Transit is the Transbay Terminal. Thirty-five transit routes terminate at the Terminal. Of the 35, 27 provide service only during commute periods. Approximately 8,500 passengers ride AC Transit buses to and from the Transbay Terminal each day. AC Transit currently utilizes the existing Transbay Terminal ramps for mid-day storage of buses.

Table 3.1-6
Existing Public Bus Service To/From the Transbay Terminal

Agency/Bus Line	Typical Weekday Hours of Operation	Typical Headway in Minutes					Weekday Boardings and Alightings at Transbay Terminal
		Weekday			Sat.	Sun.	
		Peak	Base	Eve	Base	Base	
■ Muni							
5 - Fulton	24 hours	7	6	15	8	9	580
12 - Folsom [1]	5:45 am - 6:00 pm	20	20	20			110
14 - Mission [1]	24 hours	5	5	10	8	9	1600
14L - Mission Limited [1]	8:30 am - 4:00 pm		20		15		200
15-Third Street [1][2]	5:30 am - 1:30 pm	8	10	15	10	10	720
38 - Geary	24 hours	5	6	10	5	9	1,350
38L - Geary Limited	6:00 am - 6:30 pm	8	6				1,160
42 - Downtown Loop [1]	5:30 am - 1:00 am	10	10	10	20	20	460
76-Marin Headlands [1][3]	9:30 am - 7:00 pm					60	N/A
F - Market Streetcar	5:30 am - 1:00 am	8	12	8	12	15	480
■ SamTrans							**Average Weeday Ridership Into/Out of San Francisco [4]**
1F - Pacifica/SF	Commute Service	8					660
5M - SF/San Mateo	Local	15	30	60	30	30	5,585
7B - SFIA/Redwood City	Local -- 6:00 am - 12:00	30	30	60	30	30	3,400
7F - SFIA/Palo Alto	Express-6:00 am - 12:00	20	30	60	30	30	1,800
16F - Palo Alto/SF	Commute Service	15					200
17F - Palo Alto/SF	Commute Service	15					---
18F - SF/San Carlos	Commute Service	15					260
19F - SF/San Mateo	Commute Service	10					260
41F - Redwood City	Commute Service	30					135
■ Golden Gate Transit							**Boardings and Alightings**
Golden Gate Transit (To/From the Transbay Terminal)	• 6 basic routes (24 hour service) terminate at the Transbay Terminal. • 2 basic routes (24 hour service) serve the Transbay Terminal. • 18 commute routes serve the Transbay Terminal.						At the Transbay Terminal = 640 On First and Fremont Streets adjacent to the Terminal = 3,140
■ Basic Transbay AC Transit Lines							**Transbay Boardings & Alightings**
F - Brkly.-Shattuck Ave.	6:00 am - 12:00	15-30	30	30			280
N - MacArthur Blvd.	5:30 am - 8:00 am 6:00 pm-midnight	30		30	30	30	617
NF - MacArthur Blvd.	6:00 am - 6:00 pm	10-30	30				272
NG - MacArthur Blvd.	6:00 am - 6:00 pm	10-30	30				174
O - Alameda	5:30 am - midnight	15	45	60	45-60	45-60	1,072
T - TI - Oak. - Alameda [x]	4:30 am - midnight	15-30	15-30	30-60	30-60	30-60	218

Table 3.1-6, continued
Existing Public Bus Service To/From the Transbay Terminal

■ AC Transit -- Commute-Hour Only Service	Peak Headways		Transbay Boardings & Alightings
A - Oak. Army Term.	30		23
B - Trestle Glen - Grand Ave.	30		118
BX	[4][4]		57
C - Piedmont	15-45		292
CB	[4][4]		94
CH - Piedmont Exp.	30		368
E - Claremont Ave.	30		128
FS	30-60		94
G - El Cerrito	15-30		304
H - El Cerr.- Kensington	15-30		232
KH - Bancroft Ave.	20-30		59
L - Richmond Exp.	20		222
LA - El Sobrante	10-30		181
LB - El Sobrante	10-30		170
LC - El Sobrante	10-30		316
LX - Richmond Exp.	20		109
NV - MacArthur Blvd.	[5]		29
OX, OX1 - Alameda Exp.	10-15		492
RCV - Castro Valley	15-30		239
S - San Leandro - Hayward	15-30		141
SW, SW1 - San Leandro - Hayward	15-30		150
U - UC's Sather Gate	60		8
V - Montclair - Park Blvd.	10-15		533
W1 - Alameda - Bay Farm	15		375
W2 - Alameda - Bay Farm	15		91
Y - Emeryville - Watergate	40		42
Z - Emeryville - West Berkeley	10-20		70
Total Average Weekday Ridership in and Near Transbay Terminal			**30,315**

[1] Route does not terminate at the Transbay Terminal.
[2] Southbound only
[3] Sunday only
[4] SamTrans, May 1996. SamTrans does not have counts for boardings and alightings at the Transbay Terminal
[5] One run during weekday p.m. commute only
[6] One, one-way run during weekday a.m. and p.m. commutes only

Sources: Published Transit Agency Schedules,
San Francisco Municipal Railway, *Draft Short Range Transit Plan 1995-2002*, Appendix A (September 1995),
San Francisco Municipal Railway, 1994-95 Section 15 Report,
San Mateo County Transit District, *SamTrans* Ridership Surveys, May 1995 Ridership by Route for San Francisco Service, and
San Francisco Planning Department, *TransBay Area Plan Background Data Report*, February 27, 1995.

Golden Gate Transit

Golden Gate Transit is operated by the Golden Gate Bridge, Highway and Transportation District. Golden Gate Transit serves Marin and Sonoma Counties and provides connections to San Francisco, the Richmond BART/Amtrak Station, and the El Cerrito Del Norte BART Station. Golden Gate Transit also provides ferry service between the Larkspur and Sausalito Ferry Terminals and the Ferry Building in San Francisco.

Golden Gate does not serve the existing CalTrain Terminal at Fourth and Townsend Streets. Its major transfer points in San Francisco are the Transbay Terminal, Seventh and Market streets near the Civic Center, and the Financial District with stops on Mission Street at Fremont and First, across from the Transbay Terminal. The Transbay Terminal is served by eight Golden Gate "basic" bus routes providing service throughout the day, as well as 18 commuter routes. The Civic Center is served by eight commuter routes and six basic routes. Two Golden Gate Transit routes meet the Larkspur and Sausalito ferries at the Ferry Building to provide shuttle service between the ferries and the Financial District, the South-of-Market area, and the Civic Center. Daily ridership on routes serving the Transbay Terminal is approximately 3,980 according to the recently completed Transbay Area Plan Report.[3]

Santa Clara Valley Transportation Authority

The Santa Clara Valley Transportation Authority (SCVTA) operates bus service throughout Santa Clara County with connections to BART and AC Transit in Fremont, to AC Transit in Milpitas, to SamTrans in Palo Alto and Menlo Park, and to the CalTrain stations within the county. Service is provided to Amtrak and Greyhound in San Jose. SCVTA also operates a light rail system from Old Ironsides Station in Santa Clara to Santa Teresa and Almaden Stations in southern San Jose.

SCVTA bus service operates from 4:30 a.m. to midnight. The buses run every 10 to 30 minutes weekdays and every 15 to 60 minutes evenings and weekends. Rail service operates at 10-minute intervals on weekdays and 15-minute intervals on Saturday and Sunday.

SCVTA serves twelve CalTrain stations in Santa Clara County with 47 routes. Table 3.1-4 shows the SCVTA buses that serve the CalTrain stations. Ten of the feeder bus routes provide only commuter service during the peak periods. The light rail system connects with CalTrain at the Tamien station just south of downtown San Jose.

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[3] San Francisco Planning Department, *Transbay Area Plan Background Data Report*, February 27, 1995.

Greyhound

Greyhound is an interregional carrier handling passengers and package freight. Greyhound does not currently serve the CalTrain Terminal at Fourth and Townsend Streets. The Greyhound terminal in San Francisco is located at the Transbay Terminal. Greyhound has about 86 bus arrivals and departures and about 800 originating riders per weekday.[4]

Amtrak

Amtrak does not provide rail service directly into San Francisco but does provide connecting bus service. Bus service is provided between the Emeryville Amtrak station and San Francisco. In San Francisco, Amtrak buses formerly stopped at the Transbay Terminal, but now stop at the Ferry Building and the CalTrain station at Fourth and Townsend Streets. Bus Route 99 provides the Amtrak connection for the Capitol, San Joaquin, Pacific, and California Zephyr Amtrak routes. Amtrak rail connections with CalTrain can be made in downtown San Jose.

Gray Line

Gray Line has tour buses and a Sacramento commute bus arriving and departing from the Transbay Terminal. Approximately 45 tour buses arrive and depart each weekday. Two Sacramento commuter buses serve downtown San Francisco per weekday.

3.1.3 Future Bus and Rail Transit Services

This section outlines the future year (2010) improvements to transit services in the study area. Chapter 2 describes the proposed CalTrain extension. The following subsections list planned rail projects in the corridor. Bus operators in the corridor are anticipated to adjust bus service in response to the rail extensions.

Muni Metro Extension

Muni is building an extension of its Metro Light Rail system to Mission Bay. This Muni Metro extension will terminate at Sixth and King streets and is expected to be complete toward the end of 1996. The Muni Metro station at Fourth and King streets, across the street from the existing CalTrain Terminal, will be the last of four new stations on the two-mile Muni Metro extension. When service on the light rail extension is implemented, Muni will eliminate service on the 32-Embarcadero and will restructure the 80X, 81X and 82X commuter routes.

The Muni Metro Embarcadero extension initially will be operated as rail shuttle service between the current CalTrain Fourth and Townsend Terminal and the Embarcadero. This shuttle service is scheduled to begin in June 1997 and will continue to operate in this mode until an Automated

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[4] San Francisco Planning Department, *Transbay Area Plan Background Data Report*, February 27, 1995.

Train Control System (ATSC) is operational. Once ATSC is operational, which is projected to be in January 1998, the extension will be run as an integral part of the Metro service. Current plans call for all J Line service and some peak hour M line service to terminate at the CalTrain Fourth and Townsend Terminal.

Within the last several years, Muni has explored several alternative transit improvements in the Bayshore Corridor, the major north-south travel route through the southeastern section of San Francisco. Muni is initiating development of an environmental impact statement (EIS) for the Bayshore Corridor Light Rail Project. This EIS will define the list of possible light rail options in the corridor, including downtown terminal options and interface with the CalTrain Bayshore Station.

BART San Francisco Airport Extension

In June 1996, BART and SamTrans adopted a project to extend BART from the town of Colma, through the cities of South San Francisco and San Bruno to the City of Millbrae and the San Francisco International Airport (SFO). Stations are proposed to be constructed in each of the cities and at the airport. A BART/CalTrain intermodal station is planned at Millbrae Avenue to facilitate passenger transfers between CalTrain and BART. The BART extension is scheduled for completion in the year 2000.

The adopted BART-SFO project is known as “the Aerial-Wye” Stub. The project would extend BART to both the San Francisco International Airport and Millbrae. BART would operate within the existing CalTrain right-of-way from a point about 350 feet north of San Bruno Avenue to a rebuilt Millbrae BART/CalTrain Station. This station would become a major multi-modal node and a CalTrain-BART transfer station. A large parking garage and bus transfer facility are also incorporated in this station’s design.

Airport access would be achieved using a narrow “wye” configuration that would operate as two branches of the BART line. During the day, one BART line would run from the proposed Tanforan BART station directly to the BART Airport station. Trains would then reverse direction for the trip back to San Francisco. Another BART line would bypass the Airport and serve the Millbrae station. There would also be a third BART line operating as a shuttle between the Millbrae-CalTrain station and the airport. The BART extension to the Airport is expected to be operational by the year 2000.

CalTrain Connection with the San Francisco International Airport

Under the BART Aerial-Wye stub plan, CalTrain passengers could transfer at the Millbrae BART/CalTrain Station to gain access to SFO. However, the JPB has recently completed a feasibility study of connecting CalTrain directly to the Airport’s Light Rail System (ALRS). The ALRS is one of the SFO’s Master Plan Projects. The ALRS would operate between the terminals and employment sites at the airport. The JPB study recommended pursuing two alternatives. One alternative would connect to a new CalTrain Station west of U.S. 101 and directly across from the Airport. The other alternative would connect to a relocated San Bruno station near I-380 and BART's proposed Tanforan station.

Planned CalTrain Improvements

CalTrain has a number of rehabilitation/replacement improvements scheduled over the next several years designed to maintain and improve the existing service. These include a series of track rehabilitation projects to replace and install continuously welded rail (CWR), tie replacement, curved rail replacement, surfacing, station area track rehabilitation, removal of fouled ballast, rail tip grinding, and contouring, grade crossing rehabilitation, and bridge rehabilitation. CalTrain will also purchase new accessible cars, which are expected to be put in service by 1999. Other improvements to the CalTrain system include new and relocated stations: the San Mateo and Hayward Park stations in San Mateo County are being relocated, and a new station is being added at San Antonio Road in the City of Mountain View that may replace the existing Castro Station. A new maintenance facility is also being planned, with programmed funds in Fiscal Years 1995-96 through 1999-00.

SamTrans Bus Network

With the introduction of BART service to Colma in the Spring of 1996, SamTrans bus Routes 2S and 22D revised to provide feeder service to this new station. Routes 1F and 5M also serve the Colma BART Station, continue into San Francisco, and terminate at the Transbay Terminal during peak hours only.

With the planned BART/SFO extension, SamTrans would again provide feeder bus routes to serve the new BART stations, with a corresponding reduction in express service from San Mateo County to downtown San Francisco.

3.1.4 Projected CalTrain Patronage and Accessibility Improvements

This section outlines future CalTrain patronage forecasts and transit travel times with and without the CalTrain Extension project. CalTrain's current and projected daily boardings and alightings by station for 1996 and 2010 are shown in Table 3.1-7. The 1996 data are for February 1996. More recent surveys show that CalTrain ridership is now approaching 24,000.[5]

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[5] *CalTrain Performance Report.*

Table 3.1-7
CalTrain Daily Boardings and Alightings

Station	1996	2010 No Build		2010 Extension	
		60 Trains	86 Trains	60 Trains	86 Trains
Transbay Terminal	-	-	-	17,400	17,800
Fourth/Townsend	11,274	5,500	5,800	3,400	3,600
22nd Street	612	100	400	100	200
Paul Avenue	80	200	200	500	500
Bayshore	470	100	100	200	200
South San Francisco	794	400	400	1,100	1,100
San Bruno	1,107	800	900	900	1,000
Millbrae	1,124	4,200	4,800	5,200	6,000
Broadway	746	1,200	1,200	1,200	1,200
Burlingame	1,228	1,900	1,500	1,800	2,000
San Mateo	1,422	1,900	2,200	2,300	2,400
Hayward Park	431	1,700	1,900	1,900	2,100
Bay Meadows	315	-	-	-	-
Hillsdale	2,020	3,000	3,300	4,100	4,500
Belmont	1,073	2,300	2,500	2,500	2,700
San Carlos	1,429	2,300	2,300	2,400	2,400
Redwood City	1,724	2,600	2,600	2,600	2,600
Atherton	428	600	900	600	900
Menlo Park	1,730	2,500	2,600	2,500	2,600
Palo Alto	2,555	4,200	5,100	4,900	5,200
California Avenue	1,893	3,200	3,600	3,200	3,600
Castro	474	1,100	1,200	1,100	1,200
Mountain View	2,303	2,800	3,000	2,900	3,100
Sunnyvale	1,970	3,500	3,800	3,600	3,900
Lawrence	1,394	1,900	2,100	2,100	2,300
Santa Clara	1,131	2,000	2,200	2,200	2,400
College Park	317	1,100	1,300	1,100	1,300
San Jose	2,430	5,000	5,500	5,400	5,900
Tamien	845	1,900	2,100	2,900	2,600
Capital	76	600	600	600	600
Blossom Hill	184	100	100	100	100
Morgan Hill	293	200	200	200	200
San Martin	114	0	0	0	0
Gilroy	385	200	200	200	200
Entries + Exits	44,371	59,200	64,500	80,700	86,800
System Entries	**22,206**	**29,600**	**32,250**	**40,350**	**43,400**

Source: CalTrain February/March 1996 Ridership Survey; MTC and San Mateo Countywide Travel Demand Models

No-Build Alternative

As shown in Table 3.1-7, two levels of CalTrain service were modeled for both the No-Build Alternative and the CalTrain Extension Alternative: 60 trains per day (existing service level) and 86 trains per day. The 86-train schedule would add trains mostly during the midday and off-peak.

In 2010, ridership north of the Millbrae Station is projected to be less than in 1996 because of expected transfers the assumed to BART station in Millbrae. For the No-Build Alternative under a 60-train weekday schedule, the system is projected to carry approximately 30,000 riders. About 32,000 weekday passengers are projected to ride CalTrain under an 86-train weekday schedule for the No-Build Alternative.

CalTrain Extension to Transbay Terminal Site Alternative

Table 3.1-7 also shows CalTrain projected daily boardings and alightings by station for the Year 2010 with the proposed CalTrain Extension to the Transbay Terminal site. For the 86-train weekday schedule, ridership is projected to increase to 43,400 trips per day, an increase of 11,150 trips over the projected 2010 No-Build ridership, and almost double the February, 1996 ridership of 22,200 trips per day. Ridership at the San Francisco terminal is likewise projected to increase, from 5,800 to 17,800 daily boardings and alightings if the terminal station were moved from Fourth and Townsend streets to the Transbay Terminal site. An additional 3,600 daily boardings and alightings are projected for a Mission Bay Station, which would be located in the vicinity of the existing terminal. Incremental increases in ridership are projected for all other CalTrain stations except those south of the Tamien Station in San Jose.

Projected Travel Times/Accessibility

Table 3.1-8 shows travel time comparisons on CalTrain for selected trips between central origins and destinations in the cited cities. These travel time estimates are taken directly from the patronage model, where they are used to help determine mode choice and trip assignment. The travel times include drive access, wait, transfer, and ride times at both ends of the trip for nine selected origins and destinations for the year 1990 and projected for the year 2010. The travel time savings under the No-Build scenario can be attributed to improvements currently underway along the CalTrain railroad such as track rehabilitation, grade crossing rehabilitation and elimination, and bridge rehabilitation.

With the CalTrain Extension, travel time savings for selected trips are projected to be ten minutes compared to No-Build conditions, except for trips beginning in the East Bay, for which the time savings are projected to be seven minutes.

Table 3.1-8
Estimated Transit Travel Times for Selected Trips

Origin*	Destination*	Travel Time (hour : min)			Projected Travel Time Savings (minutes)
		1990	2010 No-Build	2010 Build	
San Jose	San Francisco	1:51	1:43	1:33	10
Sunnyvale	San Francisco	1:31	1:26	1:16	10
San Mateo	San Francisco	0:57	0:53	0:43	10
Burlingame	San Francisco	0:49	0:46	0:36	10
San Bruno	San Francisco	0:46	0:44	0:34	10
Downtown San Francisco	San Francisco Airport	0:56	0:51	0:41	10
North Beach (San Francisco)	San Francisco Airport	1:02	0:57	0:47	10
Palo Alto	Berkeley	2:00	1:55	1:48	10
Downtown Oakland	San Carlos	1:51	1:44	1:37	7

*The travel times include drive access, wait, transfer, and ride times at both ends of the trips between central origins and destinations in the cited cities.
Source: Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996.

3.2 VEHICULAR TRAFFIC

This section describes the regional roadways in the CalTrain corridor, local streets in the project area, and traffic conditions on those facilities.

3.2.1 Regional Roadways in Corridor

The study area is served by three freeways -- Interstate 80, Interstate 280, and U.S. Highway 101. These are all limited-access, divided facilities and are described further below.

Interstate 80 (I-80)

I-80 is oriented east-west across the country from San Francisco to New York City. The San Francisco - Oakland Bay Bridge is part of the I-80 system, connecting San Francisco to the East Bay. The Bay Bridge has five lanes eastbound and five lanes westbound. The portion of I-80 between U.S. 101 and the Bay Bridge that crosses the CalTrain project area exists as an eight-lane facility. Existing daily traffic volumes in this segment range from 187,000 vehicles to 226,000 vehicles. The Bay Bridge carries approximately 254,000 vehicles per day. During the peak hour, Caltrans estimates show I-80 carries nearly 20,000 vehicles in the segment between U.S. 101 and the Bay Bridge.

Interstate 280 (I-280)

I-280 passes near the western end of the study area, serving South San Francisco and western Peninsula cities. The freeway runs north-south and extends from San Francisco southward to San Jose. I-280 and U.S. 101 cross south of downtown San Francisco. Just south of where U.S. 101 crosses, daily traffic volumes are 142,000 vehicles per day. Due to damage from the 1989 Loma Prieta earthquake, I-280 north of U.S. 101 has been reconstructed and retrofitted and has just recently fully reopened with exits at Army Street, Mariposa Street, and Sixth Street and its terminus at Fourth Street. Traffic volumes have not been estimated since the freeway has reopened.

New ramp connections to I-280 from King Street, adjacent to the existing CalTrain Terminal at Fourth and Townsend Streets, are under construction and expected to open in 1997. The new ramps will provide for more direct access between I-280 and The Embarcadero.

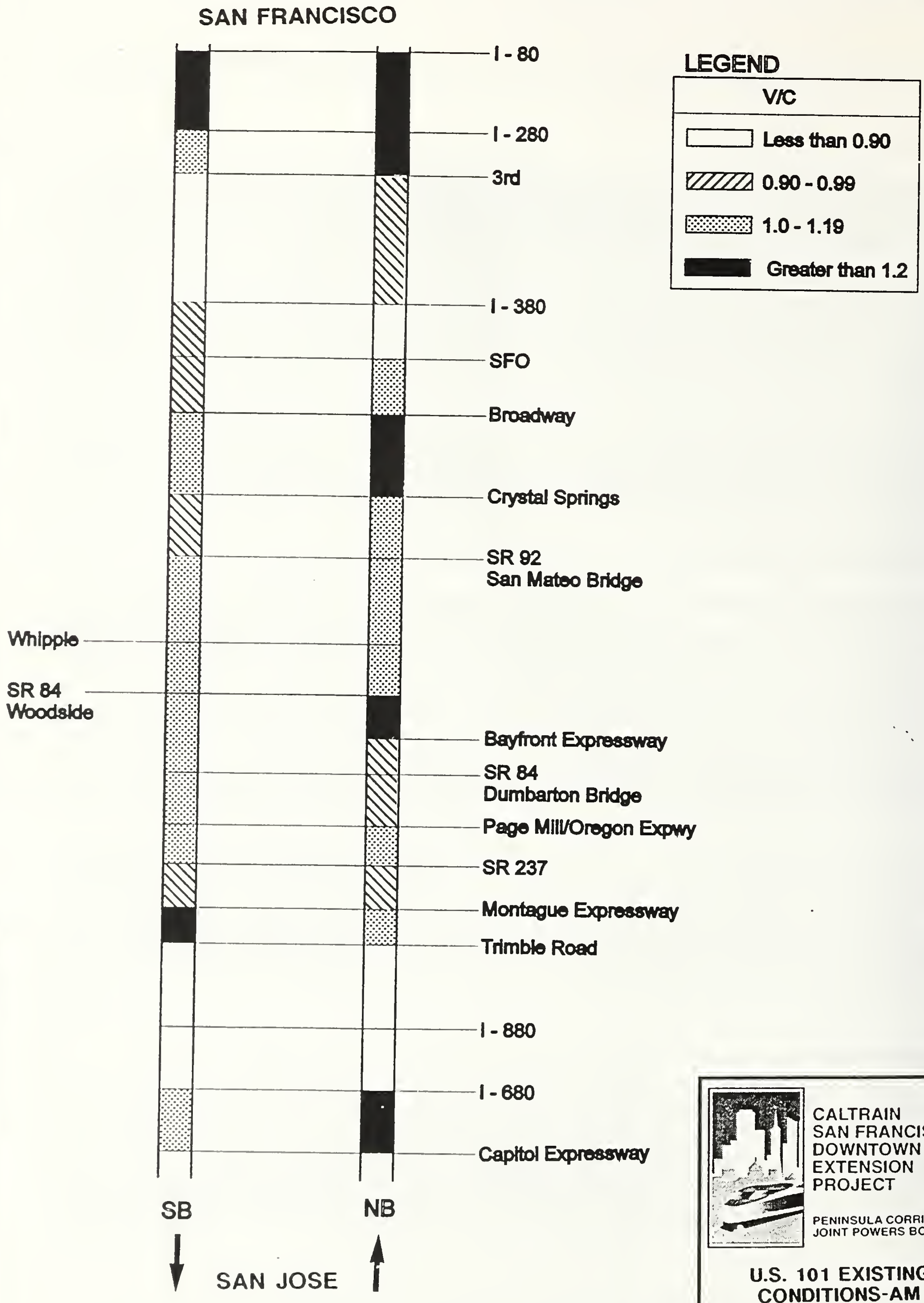
U.S. Highway 101 (U.S. 101)

U.S. 101 passes south and west of the study area. It serves the entire CalTrain corridor, including San Francisco, the Peninsula, San Jose, and Gilroy. U.S. 101 extends north to the Golden Gate Bridge, Marin County and beyond to the Seattle area, and south through the state to Los Angeles. It is primarily an eight-lane facility south of I-80 and along the Peninsula. From the southern San Francisco city limits to I-80, the average daily traffic ranges from 176,000 to 265,000 vehicles, with the highest volumes near the I-80 junction. In San Mateo County, the average daily traffic volumes range from 168,000 to 233,000 vehicles, with the highest volumes near the interchange with State Route 92 and in the vicinity of the San Francisco International Airport.

In Santa Clara County, U.S. 101 average daily traffic volumes are highest near San Jose (reaching about 219,000 vehicles) and around Mountain View near State Route 85 (about 200,000 vehicles). The traffic volumes are lowest in the southern part of Santa Clara County, with average daily volumes around 60,000 vehicles in Gilroy. Figure 3.2-1 shows the congested segments of U.S. 101 based on information provided by the San Mateo County Transportation Model, Caltrans, and the MTC Travel Demand Model.

El Camino Real

In addition to the three freeways described above, State Route 82 (El Camino Real) runs north-south in the CalTrain corridor, serving the Peninsula cities. El Camino Real is the only continuous arterial street serving the entire length of the Peninsula, and carries up to 3,000 vehicles during the peak hour in some segments near the CalTrain stations in Millbrae and San Bruno. Many of the CalTrain stations have access to El Camino Real or a nearby parallel road.

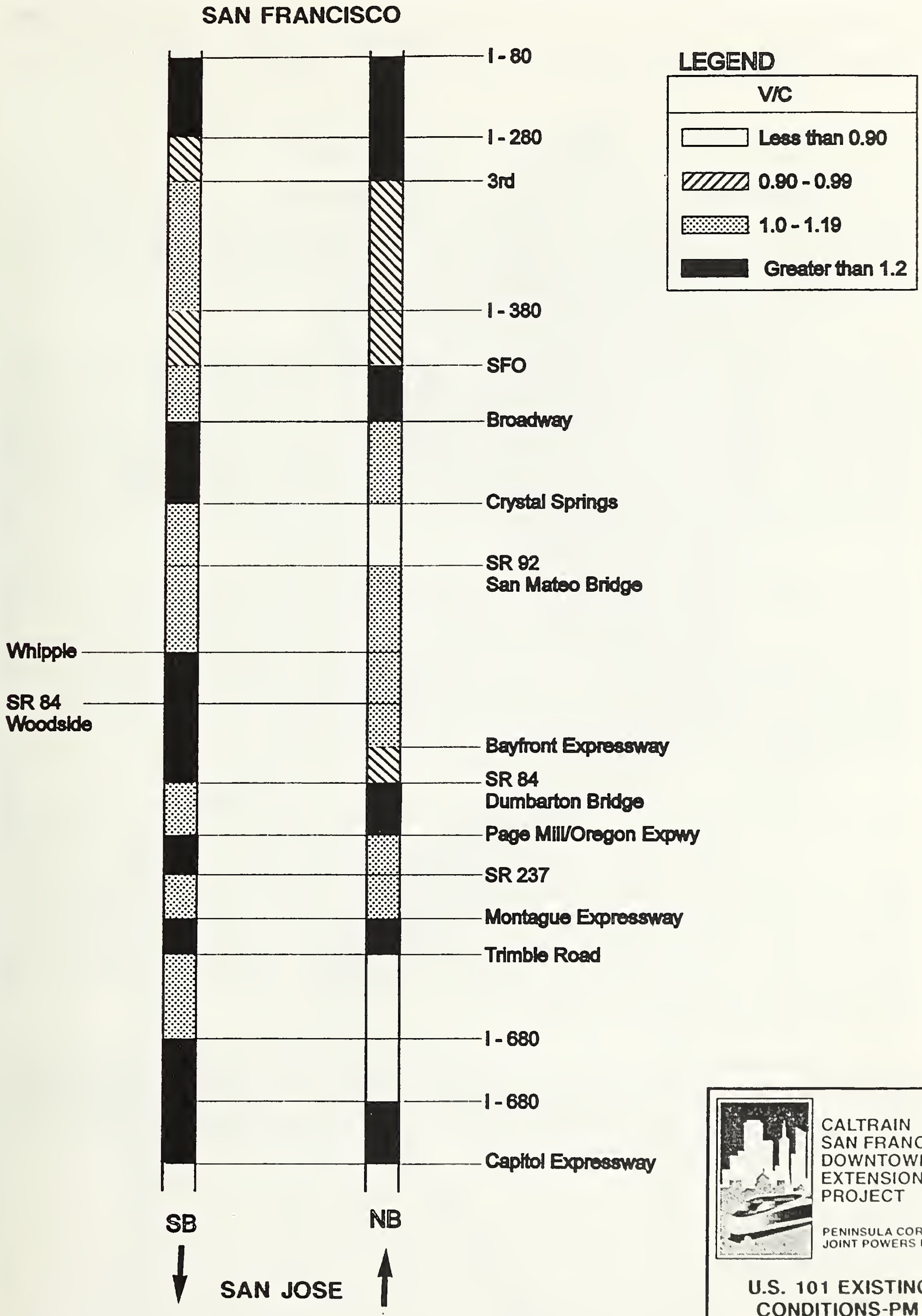


CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

U.S. 101 EXISTING
CONDITIONS-AM

Figure 3.2-1a



CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

U.S. 101 EXISTING
CONDITIONS-PM

Figure 3.2-1b

3.2.2 Street Network in Project Area

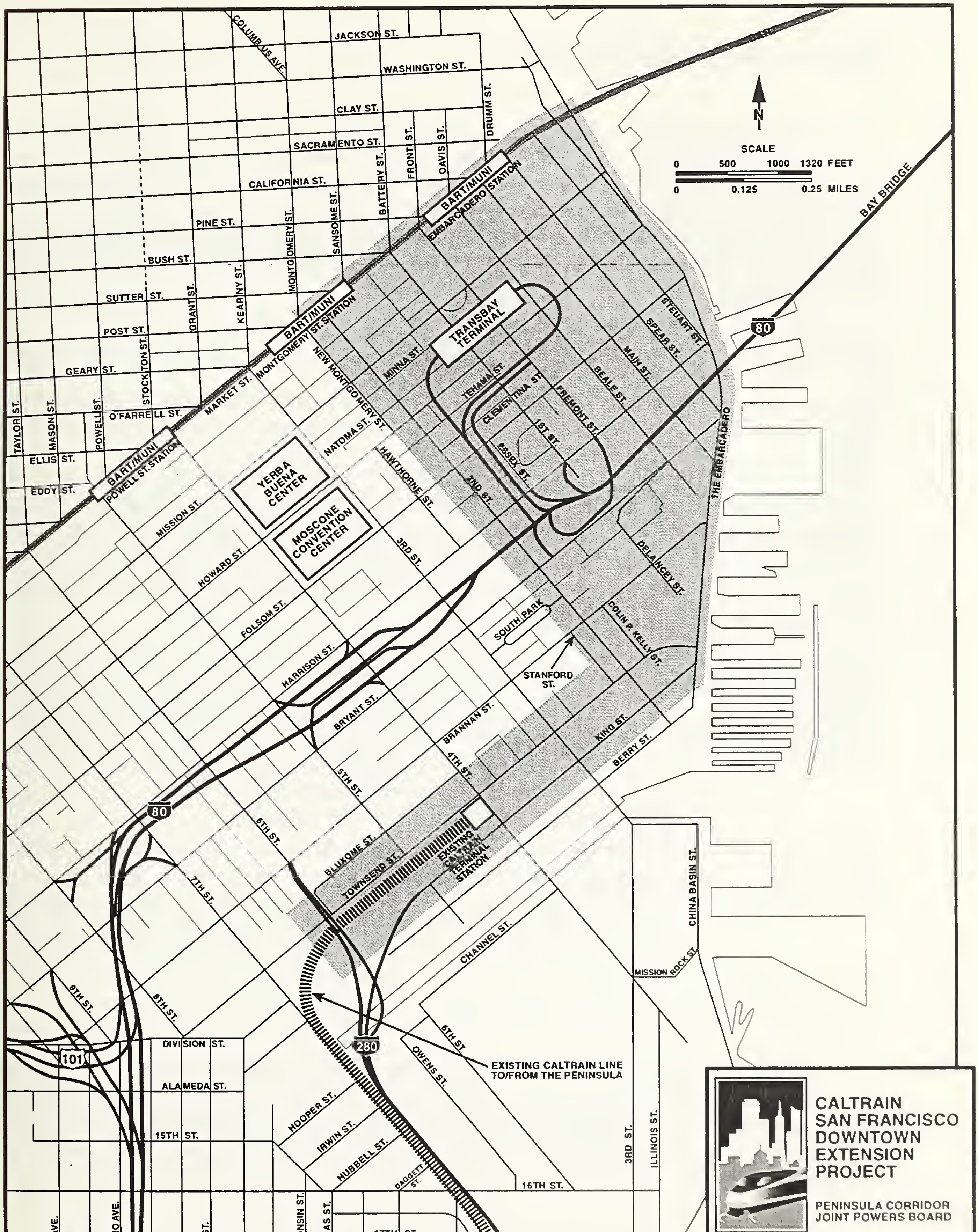
The study area defined for the traffic analysis is illustrated by Figure 3.2-2. With the exception of a panhandle area running west along Townsend Street to Sixth Street, the boundaries of the traffic study area are Market Street to the north, New Montgomery Street to the west, Berry Street to the south, and the San Francisco Bay to the east. This area is the primary focus of the traffic evaluation for the CalTrain Extension Alternative.

The study area has a well-developed street system between Market Street and Bryant Street. Streets are primarily one-way, and block lengths are usually between 425 to 900 feet in the east-west direction and 300 to 600 feet in the north-south direction. According to the Transportation Element of the *San Francisco General Plan*, the primary northbound and southbound arteries are Main, Beale, Third, Fourth, Fifth, and Sixth Streets. Main and Third Streets provide one-way northbound traffic, and Beale and Fourth Streets provide one-way southbound traffic. Fifth and Sixth Streets are used for two-way traffic.

Primary east-west arteries include Howard, Folsom, Harrison, and Bryant Streets, and a portion of King Street. Folsom Street is currently a four lane eastbound street except from The Embarcadero to Main Street, where it becomes a two-way street, with three lanes eastbound and one lane westbound. Bryant Street is also one-way eastbound, except for the portion east of Sterling Street, which is two-way. Howard and Harrison Streets are one-way streets westbound; although Howard Street is two-way east of Fremont, and Harrison Street is two-way east of Third Street. King Street is used for two-way traffic.

East-west streets in the study area include Market and Mission Streets, which provide two lanes of traffic in each direction, and which are designated as “Transit Preferential Streets” in the *San Francisco General Plan*. Mission Street is a transit-preferential arterial, having one of its two lanes in the westbound direction, between Main Street and Third Street (7 a.m. to 6 p.m., weekdays) and between Fourth and Eleventh Streets (4 p.m. to 6 p.m., weekdays), dedicated as a bus-only lane. In the eastbound direction, Mission Street has a bus lane between Eleventh Street and Fifth Street (7 a.m. to 9 a.m. and 4 p.m. to 6 p.m., weekdays), and between Third Street and Beale Street (7 a.m. to 6 p.m., weekdays).

Market Street also serves as a transit-oriented arterial. It has two lanes in each direction with bus and historic trolley stops on center islands and bus stops at the curb. The left curb lanes on First Street (between Market Street and Howard Street) and on Fremont Street (between Mission Street and Market Street), are also exclusive bus lanes.


N
SCALE
0 500 1000 1320 FEET
0 0.125 0.25 MILES
JACKSON ST.
WASHINGTON ST.
COLUMBUS AVE.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
TAYLOR ST.
MASON ST.
POWELL ST.
STOCKTON ST.
GRANT ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
MARKET ST.
TRANSBAY TERMINAL
NEW MONTGOMERY ST.
MINNA ST.
TEHAMA ST.
CLEMENTINA ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
1ST ST.
ESSEX ST.
NATOMA ST.
HAWTHORNE ST.
2ND ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
SOUTH PARK
STANFORD ST.
DELANCEY ST.
COLIN P. KELLY ST.
KING ST.
BERRY ST.
THE EMBARCADERO
BAY BRIDGE
80
80
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN TERMINAL STATION
CHANNEL ST.
CHINA BASIN ST.
MISSION ROCK ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
280
280
101
101
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
MARIPOSA ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
6TH ST.
3RD ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

TRAFFIC STUDY AREA

Figure 3.2-2

Under existing conditions, the study area contains two off-ramps from the Bay Bridge: at Fremont Street between Folsom Street and Howard Street and at Fremont and Harrison Streets. There are three I-80/Bay Bridge eastbound-on-ramps in the study area: Essex and First streets (both at Harrison Street), and Bryant Street at Sterling Street. Access to and from the Peninsula using the I-80 freeway is not included in the study area, i.e., via on- and off-ramps at Fourth Street between Harrison and Bryant Streets. The 6th Street I-280 on-and-off ramps at Brannan Street are also not part of the traffic study area.

3.2.3 Existing Traffic Conditions

This section outlines existing traffic conditions in the project area. The analysis was completed for the City of San Francisco to analyze Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure.

Changes in the street and freeway network as a result of the 1989 earthquake have affected the volume of automobile traffic in the study area, as well as travel time, speed and congestion. Traffic operating conditions for surface streets in the study area are described using overall network statistics. These statistics indicate the levels of congestion and delay that occur in the study area under existing conditions.

Level of Service (LOS) designations are used as qualitative descriptors of an intersection's performance based on traffic delays. An intersection's LOS could range from A, representing free-flow conditions, to F, representing jammed conditions, corresponding to average delay, as follows.

Level of Service	Average Vehicle Delay (Seconds per Vehicle)
A	<= 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	≥ 60.0

Table 3.2-1 presents the traffic network-wide statistics for surface streets in the study area for the a.m. and p.m. peak hours under existing (1993) conditions. Vehicle miles of travel (VMT) in the study area during the evening commute peak hour are approximately 10 percent higher than during the morning peak. The increase is due to the presence of a higher number of vehicles on the streets during the p.m. peak hour.

Table 3.2-1
Study Area Surface Street Network-Wide Peak Hour Statistics Existing (1993) Traffic Conditions

Measure of Effectiveness	AM	PM
Vehicle Miles of Travel	17,830	19,670
Vehicle Hours of Travel	1,130	1,460
Average Speed (mph)	16	13

Source: Korve Engineering, Inc.

Similarly, the number of vehicle hours of travel (VHT) during the evening peak commute hour is approximately 30 percent higher than during the morning peak. This is due to the presence of a larger number of vehicles during the p.m. peak hour, combined with higher levels of congestion. As a result, the average speed on surface streets during the p.m. peak hour is three mph (20 percent) lower than during the a.m. peak hour.

Table 3.2-2 presents the base year (existing) conditions LOS at key intersections in the study area. Table 3.2-2 indicates that under base year conditions, all 29 signalized intersection analyzed operate at an acceptable LOS (D or better) during the weekday morning and evening peak commute hours, with the exception of the Bush Street/Battery Street intersection. During the weekday peak hours, this intersection operates at LOS E (a.m. peak) and F (p.m. peak), primarily due to the high volume of vehicles seeking access to the I-80 freeway from Battery, Bush, and First Streets.

Table 3.2-3 presents the average a.m. and p.m. peak hour travel speeds for existing conditions at key segments in the vicinity of the proposed bus terminal. Under existing conditions, peak hour travel speeds on the surface streets in the study area range from 10 to 18 mph during the a.m. peak hour and from 8 to 17 mph during the p.m. peak hour.

Table 3.2-2
Intersection Delay (seconds per vehicle) and Level of Service (LOS) Summary Existing (1993) Traffic Conditions

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Battery St. & Bush St.	42	E	63	F
2. Market St. & Fremont St.	6	B	8	B
3. Market St. & Beale St.	6	B	8	B
4. Mission St. & First St.	9	B	8	B
5. Mission St. & Fremont St.	3	A	13	B
6. Mission St. & Beale St.	9	B	6	B
7. Mission St. & Main St.	6	B	10	B
8. Howard St. & Second St.	6	B	12	B
9. Howard St. & First St.	3	A	10	B
10. Howard St. & Fremont St.	7	B	8	B
11. Howard St. & Beale St.	6	B	4	A
12. Howard St. & Main St.	7	B	8	B
13. Folsom St. & Second St.	12	B	15	B
14. Folsom St. & Essex St. (*)	6	B	5	A
15. Folsom St. & Fremont St.	19	C	7	B
16. Folsom St. & Beale St.	3	A	5	A
17. Folsom St. & Main St.	7	B	6	B
18. Folsom St. & The Embarcadero (*)	19	C	6	B
19. Harrison St. & Essex St./I-80 eb on-ramp	7	B	15	C
20. Harrison St. & First St./I-80 eb on-ramp	4	A	8	B
21. Harrison St. & Fremont St./I-80 wb off-ramp	12	B	4	A
22. Harrison St. & The Embarcadero (*)	7	B	6	B
23. Townsend St. & Third St.	12	B	31	D
24. Townsend St. & Fourth St. (*)	13	B	14	B
25. Townsend St. & Fifth St. (*)	4	A	11	B
26. King St. & Third St.	14	B	22	C
27. King St. & Fourth St. (*)	2	A	4	A

(*) Denotes Unsignalized Intersection. Minor approach Level-of-Service.

Source: Korve Engineering, Inc.; *Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure DEIS/DEIR*, August 1995.

Table 3.2-3
Average Travel Speeds (mph)
Existing (1993) Traffic Conditions

Street Segment	AM	PM
Market Street eastbound (Second St. to Main St.)	11	10
Market Street westbound (Main St. to Sansome St.)	11	8
Mission Street westbound (The Embarcadero to Fremont St.)	10	10
Howard Street westbound (Steuart St. to First St.)	11	12
Folsom Street eastbound (First St. to The Embarcadero)	10	17
Harrison Street westbound (The Embarcadero to Essex St.)	11	14
First Street southbound (Market St. to Harrison St.)	17	12
Fremont Street northbound (Folsom St. to Market St.)	14	12
Beale Street southbound (Market St. to Folsom St.)	18	16
Main Street northbound (Harrison St. to Market St.)	14	15

Source: Korve Engineering, Inc., *Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure*, Transportation Technical Report, November 22, 1994

3.2.4 Future Street Network in Project Area

The following roadway improvements are not part of the proposed CalTrain project, but are expected to be in place by the year 2010. Most of these changes would be related to the roadway improvements called for under the San Francisco Department of Parking and Traffic (DPT) Variant Alternative, selected by the San Francisco Board of Supervisors as the Locally Preferred Alternative for the replacement of the Embarcadero Freeway and the Terminal Separator Structure.

- The existing I-80 Fremont Street off-ramp would be modified so that a portion of the ramp would touch down at the intersection of Fremont and Folsom Streets. There would be four lanes on the off-ramp approach; two lanes would direct traffic towards the waterfront via Folsom Street, and the other two lanes would direct traffic towards downtown via Fremont Street.

- The eastbound approach of Folsom Street at Second Street would be restriped to provide an exclusive left-turn lane, four through lanes, and an exclusive right-turn lane. (Folsom Street currently provides four lanes at this location.)

- Fremont Street would be restriped to include an additional mixed-flow through lane from the I-80 westbound off-ramp at Harrison Street to and across Market Street. (Fremont Street currently has four mixed-flow lanes from Howard to Mission Streets and two mixed-flow lanes and a transit-only lane from Mission to Market Streets.) The current two-way segment between Folsom and Harrison Streets would remain two-way operation. At Mission Street, there would be three through lanes, one left-turn-only lane, and one right-turn-only (transit excepted) lane. At Market Street, there would be a left curb transit-only lane, a transit island, and three through lanes. The left-most through lane pavement would include the F-Market line transit tracks.

- First Street would be restriped between Howard and Harrison Streets to provide a new peak-hour only left-side transit lane against the east curb. Left turns from First Street onto Harrison Street would be allowed in this transit lane during peak hours.

- Harrison Street would be re-striped to one-way westbound, from First Street to Third Street.

- When warranted by congestion levels in the future (sometime before the year 2015), the existing p.m. peak-period carpool operation on the Bryant Street approaches to the Sterling Street on-ramp would be changed to mixed-flow operation, and the current mixed-flow operation on the Essex Street approach to the Bay Bridge would be restricted to HOV operation during the p.m. peak period.

- King Street, from Third Street to Fifth Street, would have two continuous lanes in each direction, with exclusive left-turn lanes and Muni Metro tracks located in the center of a landscaped median. A set of on- and off-ramps to/from I-280 would be constructed to connect the freeway with King Street, immediately west of Fifth Street. These improvements are currently under construction with completion set for late 1996. The existing I-280 off-ramp at Berry Street/Fourth Street would be removed.

3.2.5 Future Traffic Conditions: No-Build Alternative

Travel Time

Table 3.2-4 compares travel times for representative trips by auto within the corridor for 1990 and projected 2010 No-Build conditions. Auto trips were assessed in three categories: drive alone, shared ride-2 persons, and shared ride-3 persons.

Table 3.2-4 AM Highway Travel Times for Selected Trips (minutes)

Trip Segment	Travel Time in Minutes	
	1990	(2010) No Build Alternative
San Jose to San Francisco		
Drive Alone	61	63
2 - Person or 3 - Person	57	58
Sunnyvale to San Francisco		
Drive Alone	49	52
2 - Person or 3 - Person	61	50
San Mateo to San Francisco		
Drive Alone	27	29
2 - Person or 3 - Person	27	29
Burlingame to San Francisco		
Drive Alone	27	29
2 - Person or 3 - Person	24	29
San Bruno to San Francisco		
Drive Alone	22	19
2 - Person or 3 - Person	22	19
San Francisco to San Francisco Airport Terminal		
Drive Alone	16	17
2 - Person or 3 - Person	16	17
North Beach to San Francisco Airport Terminal		
Drive Alone	19	20
2 - Person or 3 - Person	19	20
Palo Alto to Berkeley		
Drive Alone	48	55
2 - Person or 3 - Person	48	47
Oakland to San Carlos		
Drive Alone	48	59
2 - Person	44	54
3 - Person	41	39

Source: Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996.

These categories allow distinction between the varying High Occupancy Vehicle (HOV) lane requirements of different Bay Area Freeways. HOV lanes are expected to be more prevalent in 2010 and are predicted to have an important effect on travel time. Table 3.2-4 shows that 2010 travel times under the No-Build Alternative are expected to increase by one to three minutes over 1990 travel times, except for San Bruno to San Francisco, where a decrease of three minutes is projected.

Street Network Statistics

Table 3.2-5 contrasts network-wide statistics for surface streets in the traffic study area for a.m. and p.m. peak hours for 1993 and 2010 under the No Build Alternative. VMT is projected to increase approximately 15 percent between 1993 and 2010. Statistics indicate an expected increase in a.m. congestion, with a.m. peak hour vehicle hours traveled (VHT) increasing by 27 percent and average travel speed dropping from 16 mph to 14 mph. PM peak hour VHT is projected to increase by 17 percent, while average travel speed in the p.m. peak is expected to remain unchanged at 13 mph between 1993 and 2010.

Table 3.2-5
Study Area Surface Street Network-Wide Peak Hour Statistics
Existing (1993) and Projected No Build (2010) Traffic Conditions

Measure of Effectiveness	AM Peak Hour		PM Peak Hour	
	Existing 1993	2010 No-Build	Existing 1993	2010 No-Build
Vehicle-Miles Traveled	17,830	20,460	19,670	22,460
Vehicle Hours Traveled	1,130	1,440	1,440	1,680
Average Speed (mph)	16	14	13	13

Source: Korve Engineering, Inc.

Intersection Level of Service

Table 3.2-6 presents the current 1993 and projected 2010 No-Build LOS conditions for the 29 study intersections during the a.m. and p.m. peak hours. The levels of service shown reflect normal traffic conditions.

Table 3.2-6. Signalized Intersection Delay (sec/veh) and LOS Summary 1993 and 2010 AM and PM Peak Hours

Intersection	AM Peak				PM Peak			
	1993		2010 No Build		1993		2010 No Build	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Battery & Bush	42	E	44	E	63	F	52	E
2. Market & Fremont	8	B	B	B	8	B	4	B
3. Market & Beale	8	8	8	B	8	B	9	B
4. Mission & First	8	B	12	B	7	B	9	B
5. Mission & Fremont	8	B	8	B	11	B	10	B
6. Mission & Beale	8	B	8	B	8	B	7	B
7. Mission & Main	8	B	8	B	10	B	11	B
8. Howard & Second	8	B	5	A	12	B	12	B
9. Howard & First	8	B	B	B	10	B	11	B
10. Howard & Fremont	7	8	8	B	8	8	9	B
11. Howard & Beale	8	B	8	B	A	A	4	A
12. Howard & Main	7	B	7	B	8	B	12	B
13. Folsom & Second	12	B	10	B	10	B	12	B
14. Folsom & Essex*	8	A	8	A	8	A	9	A
15. Folsom & Fremont	10	C	34	D	7	B	11	B
16. Folsom & Beale	8	A	17	C	8	A	4	B
17. Folsom & Main	7	B	8	B	6	B	4	A
18. The Embarcadero & Folsom*	10	C	17	C	6	B	15	B
19. Harrison & Essex St	A	A	7	B	15	C	11	B
20. Harrison & First	A	A	7	B	6	B	7	B
21. Harrison & Fremont	12	B	B	B	4	A	4	A
22. The Embarcadero & Harrison*	7	B	7	B	6	6	11	B
23. Third & Townsend	12	B	12	B	31	D	27	D
24. Fourth & Townsend	10	B	12	B	10	8	13	B
25. Fifth & Townsend**	4	A	9	B	11	B	81	F
26. Third & King	14	B	27	D	22	C	40	D
27. Fourth & King	2	A	15	B	4	A	13	B

*Denotes Unsignalized Intersection in 1993.
**Denotes Unsignalized Intersection in both years.

Source: Korve Engineering, Inc.

Given the high volume-to-capacity ratios estimated at the freeway on-ramps in the vicinity of the CalTrain terminal, the intersections near these ramps would quickly deteriorate to less than acceptable conditions (LOS E or F) in the case of an accident, construction, or a stall on the Bay Bridge or on U.S. 101, or in the case of greater traffic volumes (on the freeway or on local streets) than those projected to occur under normal conditions. The DPT estimates that "incident" conditions occur in the evening peak period about 25 percent to 30 percent of weekday evenings, and less often in the morning commute period.

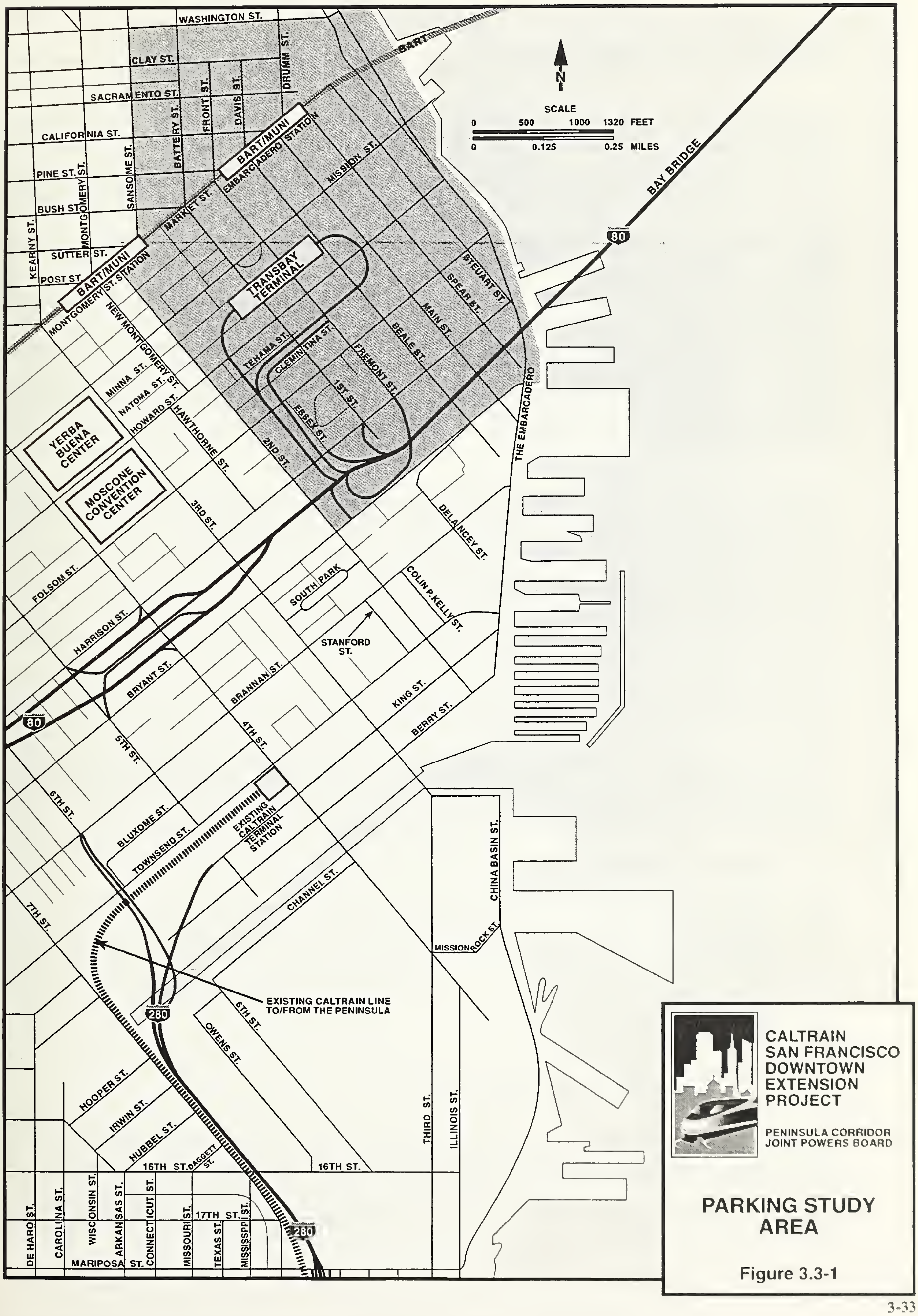
Table 3.2-6 shows that while there are projected increases in delay at some intersections between 1993 and 2010, only Battery/Bush and Fifth/Townsend are projected to operate at an unacceptable level of service (E or F). Only two other intersections are projected to degrade below LOS C between 1993 and 2010. The LOS for Folsom/Fremont is projected to decrease from C to D in the a.m. peak hour. The LOS for Third/King Streets also is projected to decrease from B/C to D in both peak hours.

3.3 PARKING

The focused parking study area is bounded by Washington Street to the north, Sansome and Second Streets to the west, Bryant Street to the south, and The Embarcadero to the east (Figure 3.3-1). This study area represents an approximate 10-minute walking distance to and from the existing Transbay Terminal site. The parking analysis focuses on off-street parking facilities such as lots and garages in the South-of-Market area.

Within the study area, the City, Port, and Caltrans as well as private entities are responsible for managing parking. The Port of San Francisco is responsible for on-street and off-street parking resources within its jurisdiction, including spaces along The Embarcadero. The San Francisco DPT is responsible for on-street parking outside Port jurisdiction. Off-street parking resources outside Port jurisdiction are generally privately owned and managed. Some off-street parking areas are located on land owned by Caltrans, which leases lots to private operators.

Parking garages and surface lots are scattered throughout the study area. Most are small-to-medium in size, containing 20 to 350 parking spaces. Some larger garages also exist, with capacity of 700 spaces or more. Weekday midday and evening period field surveys were conducted in October 1995 by Korve Engineering to determine the occupancy rate of the parking supply in the study area. The data (Table 3.1-1) show an overall parking occupancy rate of 85 percent during the weekday at 1:00 p.m. that drops to about 60 percent at 5:00 p.m.


WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
MARKET ST.
MISSION ST.
N
SCALE
0
500
1000
1320 FEET
0
0.125
0.25 MILES
BAY BRIDGE
80
TRANSBAY TERMINAL
STEUART ST.
SPEAR ST.
MAIN ST.
BEALE ST.
FREMONT ST.
1ST ST.
ESSEX ST.
CLEMINTINA ST.
TEHAMA ST.
2ND ST.
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HOWARD ST.
HAWTHORNE ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
3RD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
SOUTH PARK
STANFORD ST.
COLIN P. KELLY ST.
DELANCEY ST.
THE EMBARCADERO
KING ST.
BERRY ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN TERMINAL STATION
CHANNEL ST.
CHINA BASIN ST.
MISSION ROCK ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
280
6TH ST.
OWENS ST.
HOOPER ST.
IRWIN ST.
HUBBEL ST.
16TH ST.
DAGGETT ST.
16TH ST.
THIRD ST.
ILLINOIS ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
17TH ST.
TEXAS ST.
MISSISSPPI ST.
MARIPOSA ST.
280
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

PARKING STUDY AREA

Figure 3.3-1

Table 3.3-1
Existing Parking within the Parking Study Area

Period	Time	Existing Parking		Existing Parking Demand	Available Spaces		Parking Occupancy	
		Total	Open*		Total	Open*	Total	Open*
Weekday	1 p.m.	16,503	16,387	14,017	2,486	2,370	84.9%	85.5%
Weekday	2 p.m.	16,503	16,387	13,827	2,676	2,560	83.8%	84.4%
Weekday	5 p.m.	16,503	16,503	9,662	6,841	6,841	58.5%	58.5%
Weekday	6 p.m.	16,503	16,503	4,909	11,594	11,594	29.7%	29.7%

* Includes only parking facilities opened for business.
Source: Korve Engineering, Inc., October 1995.

In addition to parking in the lots and garages, there are approximately 2,500 on-street spaces in the study area. About 200 of these spaces are under the Port's jurisdiction.

3.4 NON-MOTORIZED TRANSPORTATION

This section describes non-motorized transportation in the project area, including existing and future pedestrian and bicycle facilities.

3.4.1 Existing Pedestrian Facilities and Usage

Pedestrian conditions were studied around the Fourth and Townsend CalTrain Terminal and the Transbay Terminal. Pedestrian counts were collected in August and September of 1995 at the following intersections during the a.m. and p.m. peak hours:

- Fourth and Townsend
- Fourth and King (unsignalized)
- Fourth and Brannan
- Beale and Mission
- Beale and Market
- Market, Pine, and Davis
- Beale and Howard
- Fremont and Mission
- First and Mission
- Ecker Alley and Mission (unsignalized)

Data for the a.m. peak hours only were subsequently collected for three additional intersections along Howard Street: First Street, Fremont Street, and Main Street. All eleven signalized intersections have crosswalks on each approach and pedestrian signal heads, except for the intersection of Fourth and Brannan Streets, which does not have pedestrian signal heads. The two unsignalized intersections (Fourth/King and Ecker Alley/Mission) do not have crosswalks. The sidewalk widths and crosswalks are shown graphically on Figures 3.4-1 and 3.4-2.

Pedestrian operations at signalized intersections were evaluated using the concept of level of service (LOS), with pedestrian operations rated on an A to F scale based on available space for the pedestrian. The LOS methodology is based on the 1985 Highway Capacity Manual, and is primarily useful for identifying problem locations for further analysis. Pedestrian LOS is evaluated based on pedestrian volumes, space utilized by pedestrians, vehicles turning right at the intersection, conflicting pedestrians and traffic signal cycle lengths. LOS A represents excellent conditions, while LOS F represents heavily congested conditions. Level of service for crosswalks was evaluated using walkway evaluation techniques; level of service for corners was evaluated using a queuing analysis.

All but two of the crosswalks at the signalized intersections are operating at LOS C or better during both peak hours. The west crosswalk of the Mission and Beale Streets intersection is operating at LOS D during both the a.m. and p.m. peak hours. During the p.m. peak hour, the west crosswalk of the Howard and Beale Streets intersection is operating at LOS D. This is primarily because there is a very narrow sidewalk on the east side of Beale Street between Mission and Howard Streets, so pedestrians tend to use the west side sidewalk.

Level of service at corners is worse than on crosswalks. During the a.m. peak hour, the northwest corner of Fourth/Townsend, the northwest corner of Fremont/Mission, the northeast corner of Market/Beale, and the southwest corner of Mission/Beale operate at LOS D or worse. During the p.m. peak hour, the following corners operate at LOS D or worse: the southeast and northwest corners of Fourth/Townsend; the northeast and northwest corners of First/Mission; the northeast corner of Market/Beale; the northwest corner of Market/Pine/Davis; and, the southwest corner of Mission/Beale. All corners at the intersections of Fourth/Brannan and Howard/Beale operate at LOS C or better during both peak periods.

The City of San Francisco also conducted an analysis of the downtown pedestrian environment that highlighted the intersection of Fremont and Howard Streets as a problem location for pedestrian/vehicle accidents.[6] Pedestrian/vehicle accidents are related to overcrowded streets as well as to intersection and crosswalk deficiencies.

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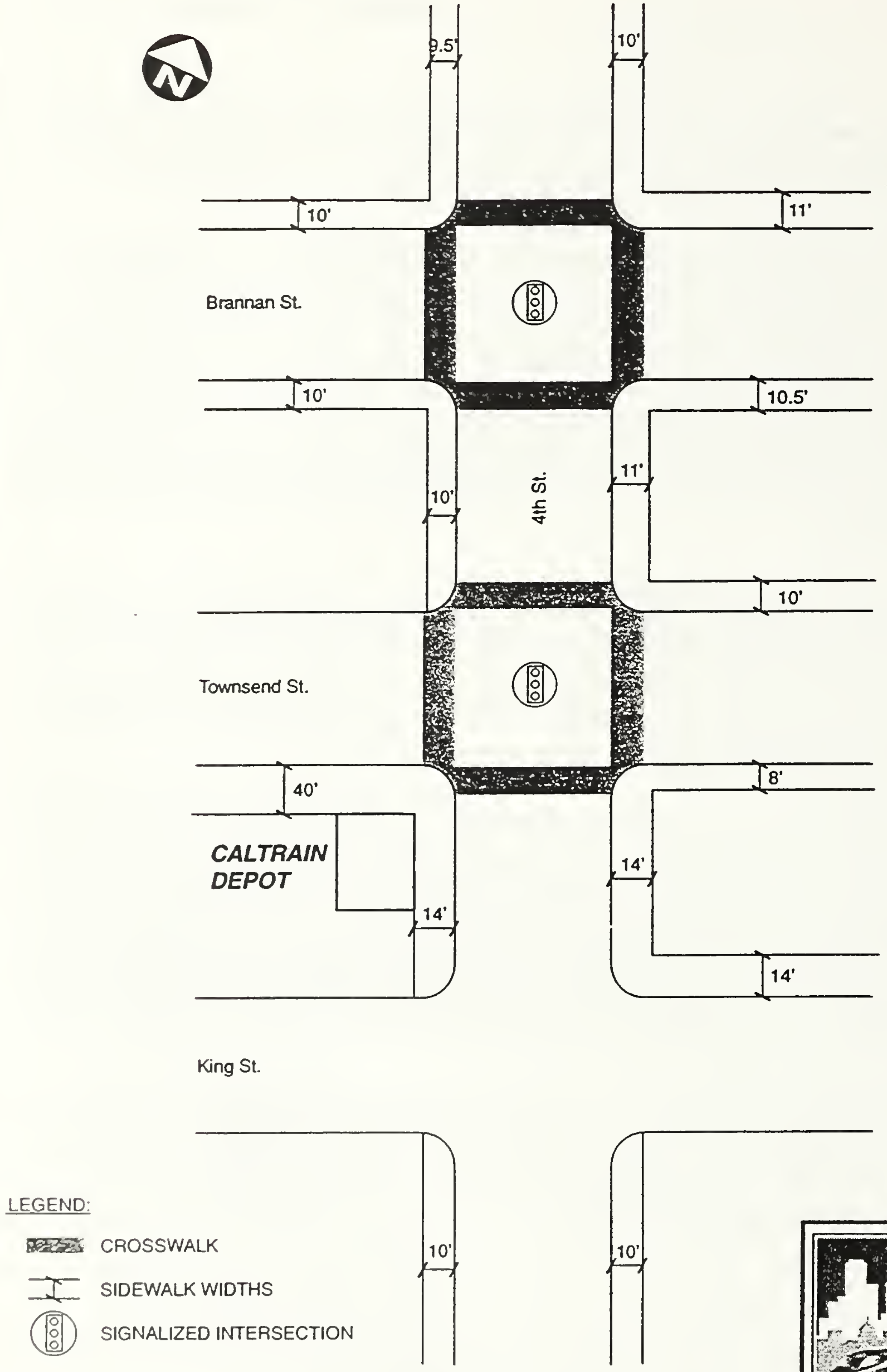
[6] San Francisco Planning Department, *Destination Downtown, Streetscape Investments for a Walkable City, The Downtown Streetscape Plan, Draft for Citizen Review*, August 1994.

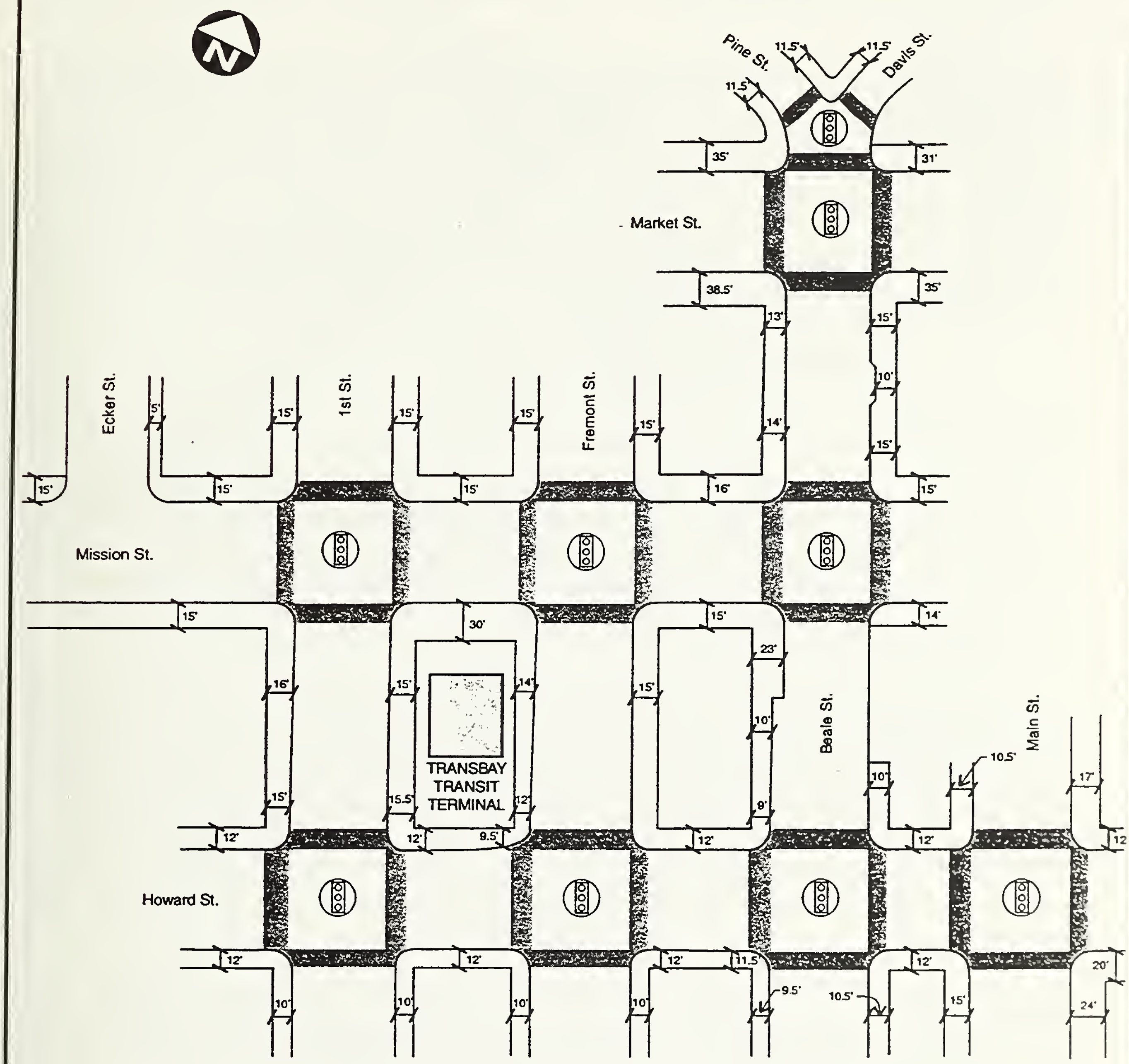

N
9.5'
10'
10'
11'
Brannan St.
10'
10.5'
11'
10'
4th St.
10'
Townsend St.
40'
8'
CALTRAIN DEPOT
14'
14'
14'
King St.
10'
10'
LEGEND:
CROSSWALK
SIDEWALK WIDTHS
SIGNALIZED INTERSECTION

CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

PEDESTRIAN SIDEWALKS AND CROSSWALKS NEAR EXISTING CALTRAIN STATION

Figure 3.4-1


Pine St.
Davis St.
Market St.
Ecker St.
1st St.
Fremont St.
Beale St.
Main St.
Mission St.
Howard St.
TRANSBAY TRANSIT TERMINAL
11.5'
11.5'
11.5'
35'
31'
38.5'
35'
13'
15'
10'
14'
15'
5'
15'
15'
15'
15'
15'
15'
15'
16'
15'
15'
15'
30'
14'
16'
15'
14'
15'
23'
15'
10'
10.5'
17'
15'
15.5'
12'
10'
9'
12'
12'
12'
12'
9.5'
12'
12'
12'
12'
12'
11.5'
12'
20'
10'
10'
10'
10'
9.5'
10.5'
15'
24'

LEGEND:

▨ CROSSWALK

⊢⊣ SIDEWALK WIDTHS

⦿ SIGNALIZED INTERSECTION

CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

PEDESTRIAN SIDEWALKS AND CROSSWALKS NEAR PROPOSED CALTRAIN STATION

Figure 3.4-2

There is currently no standard method of evaluating pedestrian levels of service at unsignalized intersections. Based on the field observations, the City's analysis noted that most of the pedestrians counted were jaywalkers crossing within 50 feet of the intersections. Pedestrians would cross the street if there were breaks in traffic. Otherwise, they would walk to the adjacent signalized intersection to cross. There was no overcrowding at the street corners observed. Although the intersection of King and Fourth was analyzed as a unsignalized intersection, this intersection will become a signalized intersection with new sidewalks after the King Street construction is finished around the end of 1996.

3.4.2 Existing Bicycle Facilities and Usage

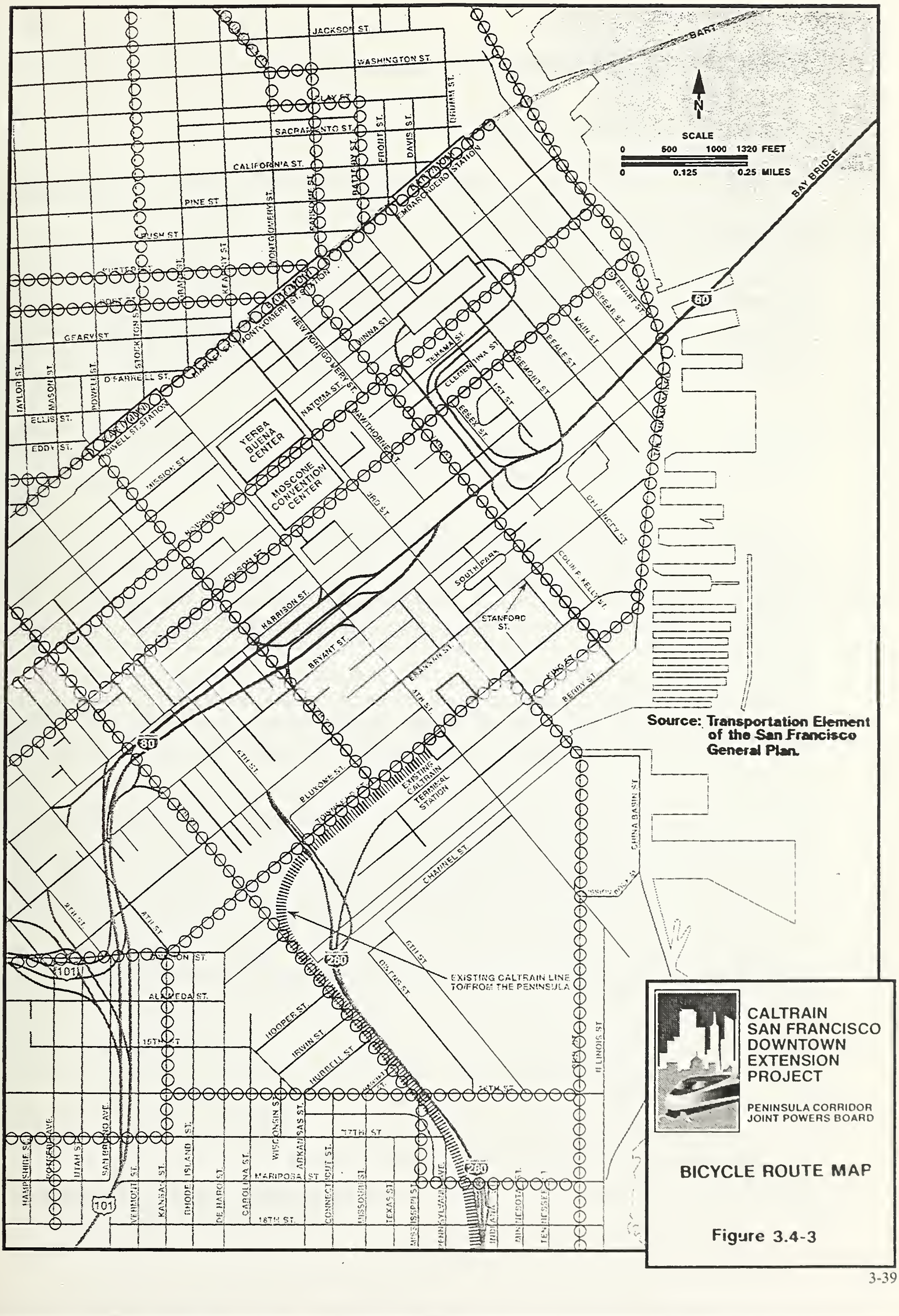
Bicycle Routes

The City's Bicycle Route Map, part of the San Francisco General Plan, shows bicycle routes that serve the study area (Figure 3.4-3). The existing bicycle system within the study area is not very visible. Few of the bike routes are signed. Some signs are present but do not continue the full length of the route; some routes are striped but not signed; many routes have inadequate curb lanes; and parking is allowed in the actual bike lanes. The following is a brief description of several of the principal routes.

The Embarcadero. The Embarcadero bicycle route brings bicycle traffic near the CalTrain terminal via The Embarcadero Roadway. It provides a flat, direct route to the terminal, although bicyclists will encounter several large intersections (Bay, Sansome, Battery, Howard, Harrison, Third and Fourth) and, at times, numerous pedestrians. Drawbacks to this route include heavy traffic volumes and congestion, with automobiles and trucks traveling at high speeds. As part of the City's Waterfront Transportation Projects, new, wide, and visible lanes are currently under construction in each direction, which should increase safety and use of this route for commuting and recreation.

Folsom Street. The Folsom Street route is currently used by many commuting cyclists. The street is heavily traveled, with autos and trucks moving at high speeds. Folsom Street provides good bicycle access from many parts of the City, particularly from the Haight and Mission areas. Folsom Street is one-way, accommodating eastbound traffic.

Howard Street. The Howard Street route is also currently used by many commuting cyclists. The street is heavily traveled, but close to the downtown, and vehicle speeds are not as high as on Folsom Street because of the activity associated with the more intensive land uses along the street. Howard Street provides good bicycle access from many parts of the City, particularly from the Haight and Mission areas. Howard Street is a one-way street for westbound traffic.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Source: Transportation Element of the San Francisco General Plan.

CALTRAIN
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EXTENSION
PROJECT

PENINSULA CORRIDOR
JOINT POWERS BOARD

BICYCLE ROUTE MAP

Figure 3.4-3

CalTrain Bicycle Facilities and Usage

The existing facilities at the CalTrain terminal include lockers and bike racks. The bicycle lockers are worn but still in demand. There are several bike racks around the station, but bicycles left in these racks are often vandalized.

CalTrain has recently installed bicycle racks in over 50 passenger rail cars operating on the San Francisco to Gilroy line. Each train can accommodate 24 bicycles. More and more cyclists are taking advantage of this service and are bringing their bikes on the train. CalTrain recently surveyed the number of bicycles on their trains on two separate days this fall. The average number of bicycles was about 800 per day.

Improvements to the facilities at the CalTrain terminal are already underway. Improved facilities and the allowance of bikes on the trains have increased the use and visibility of bicycle commuting as well as the need for efficient and safe bike routes to/from the station.

3.4.3 Future Pedestrian Walkways and Bicycle Facilities

The San Francisco Planning Department has designated some streets and alleys in the project vicinity for special pedestrian focus. In *Destination Downtown*,[7] Mission Street has been designated as a Special Street, while Steuart, Beale, and Second Streets have been designated as Second Level Streets. Minna and Ecker Streets have also been designated as Walkthrough Alleys. The Special Street designation is for streets that are the destination street for a sub-district and should be the centers of pedestrian amenities and activities, with design treatments that do not appear elsewhere. Second Level Streets are designated as significant pedestrian paths between important destinations, with improvements designed to facilitate movement and highlight destinations.

The DPT is currently in the process of developing a Comprehensive Bicycle Plan to guide all future San Francisco bicycle improvements and programs. Under the proposed plan, there will be four routes which will serve the existing CalTrain terminal and the Transbay Terminal. The Embarcadero Route will become a designated Class I bike path, while the three remaining routes will be considered Class II bike routes and will be striped and signed. The additional route added to the system will bring cyclists to the station via Fifth Street with a left turn onto Townsend, one block from the CalTrain terminal. This route will provide a direct way to reach the terminal from Market Street.

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[7] San Francisco Planning Department, *Destination Downtown, Streetscape Investments for a Walkable City, The Downtown Streetscape Plan, Draft for Citizen Review*, August 1994.

CHAPTER 4: AFFECTED ENVIRONMENT

This chapter presents information on the environmental setting in the project area, organized by environmental issue category. The project study area encompasses the geographic area potentially most affected by the project. For most issues involving physical effects, this is the project footprint, or the area that would be disturbed for or replaced by new project facilities. This area extends along the CalTrain corridor from Gilroy to the Transbay Terminal in downtown San Francisco, but focuses on the area in San Francisco from about 16th Street and I-280 to the Transbay Terminal. Socioeconomic effects may be felt over a larger area.

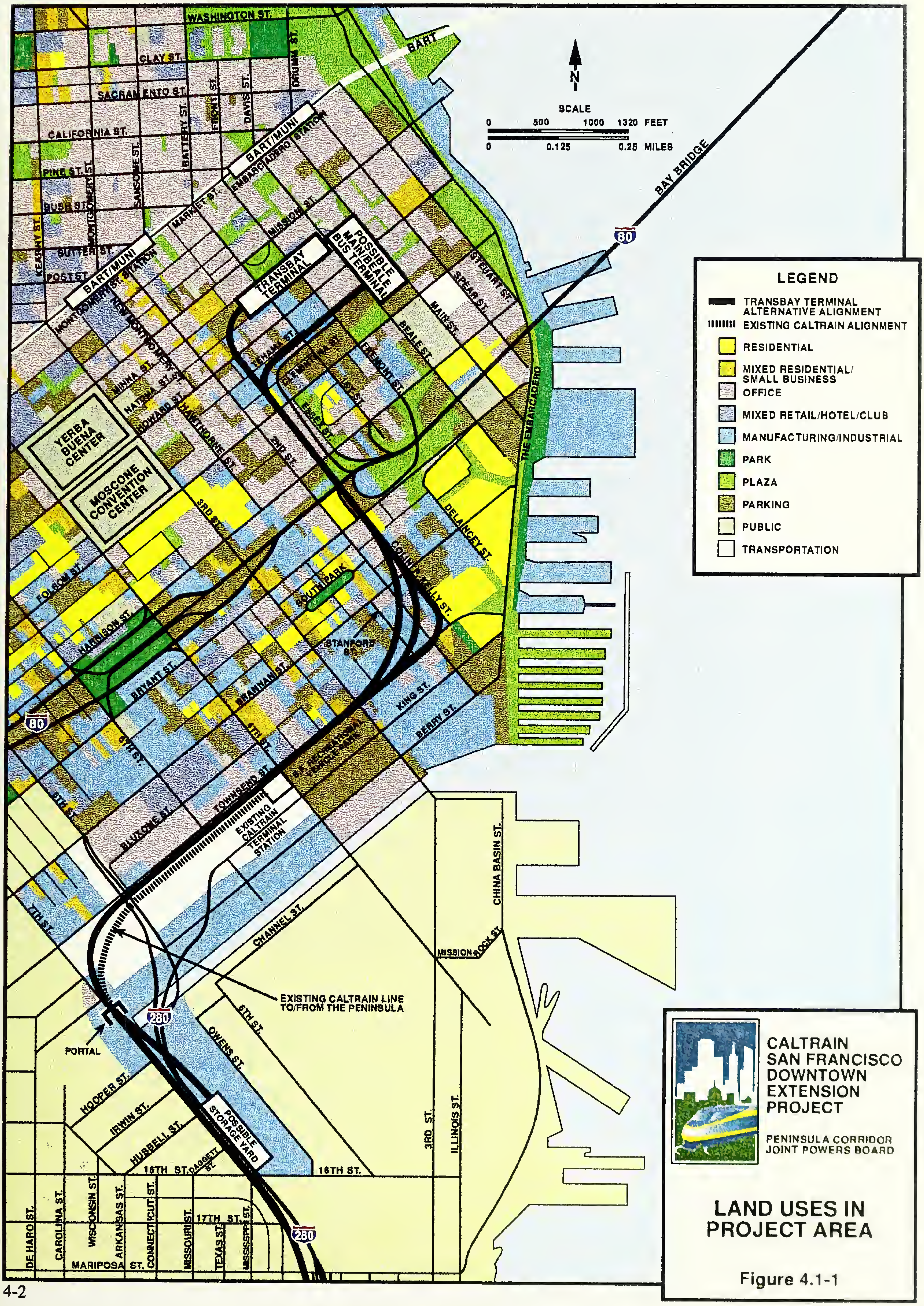
4.1 LAND USE

4.1.1 Existing Land Uses in the Study Area

The CalTrain project study area in San Francisco is in transition from an industrial, warehousing and manufacturing district to one of mixed use commercial, retail, small office, and residential uses, as supported by the City of San Francisco's zoning, area plans, and redevelopment proposals. Although vacant land for new construction is limited, creative conversion and adaptive reuse of older, vacant or historical buildings typifies development in the area.

Figure 4.1-1 displays existing land uses in the project area. Major existing residential development occurs in the southeast portion of the study area between Berry and Bryant Streets and Second Street and San Francisco Bay as part of the South Beach Redevelopment Area. Relatively new residential, mixed use complexes include Bayside Village, Embarcadero Triangle (often called the Delancey Street Project), South Beach Marina Apartments, and Steamboat Point. The Baycrest Condominium high rise is located north of these developments at Main and Harrison Streets in the Rincon Hill Planning Area. The South Beach Redevelopment Area and Rincon Hill Planning Area (see Section 4.1.2) are targeted for continued medium- and high-density residential development. New development proposals are under consideration for the blocks west of Delancey Street, adjacent to the existing South Beach residential complexes.

Older residences along with a mix of commercial and newer residential projects are located in the South Park area between First and Essex Streets and Harrison and Folsom Streets. Infill housing and artist live/work units exist in a variety of locations in the South of Market Area (SOMA), south of I-80, and Rincon Hill; and continuing development of these units is encouraged by City plans. Opportunities for conversion of warehouse/office buildings to live/work lofts exist in the area south of I-80 between Third and Fifth Streets. Residential hotels, such as those in the South Park area, are proposed in area plans to be refurbished for use as affordable housing.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LEGEND
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RESIDENTIAL
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MIXED RETAIL/HOTEL/CLUB
MANUFACTURING/INDUSTRIAL
PARK
PLAZA
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TRANSPORTATION
WASHINGTON ST.
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BART/MUNI MONTGOMERY ST. STATION
MARKET ST.
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TRANSBAY TERMINAL
POSSIBLE MAIN/BEALE BUS TERMINAL
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SPEAR ST.
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CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

LAND USES IN PROJECT AREA

Figure 4.1-1

4.1.2 Area Plans

General land use objectives and policies are identified in elements of the San Francisco General Plan. Individual area plans describe land use policy for specific sub-areas of the project area and SOMA, as shown in Figure 4.1-2.

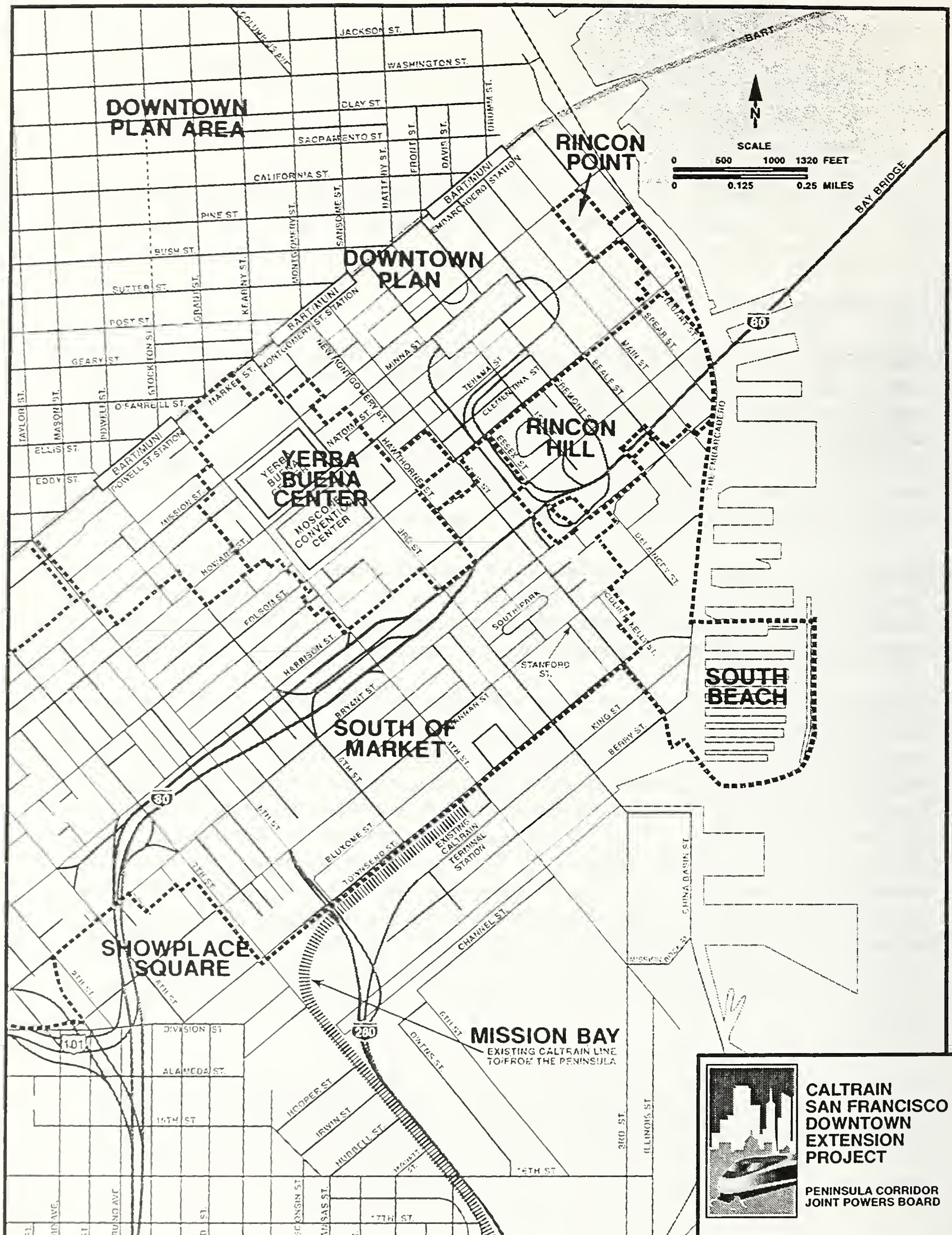
City Planning Areas

Downtown. The *Downtown Plan* is designed to manage downtown San Francisco growth and development, and to maintain the City's character and livability. The *Downtown Plan* affects the areas shown in Figure 4.1-2, including the area around the existing Transbay Terminal. The Plan identifies locations for future commercial and secondary office uses in the area west of the Yerba Buena Center Area. The Plan also recommends a major park or chain of parks for the area of open space deficiency identified midway between Yerba Buena Gardens and the proposed Rincon Point Park (proposed for the waterfront, between Howard and Harrison Streets).

Mission Bay. Mission Bay is a 300-acre site bounded by Townsend, Mariposa, and Seventh Streets and China Basin. The City's *Mission Bay Plan*, adopted in September of 1990 as an element of the City's General Plan, envisions a new urban neighborhood consisting of living and working land uses linked by an extensive open space system.

As approved by the City of San Francisco in 1991, the Mission Bay *project*, which is within the area covered by the *Mission Bay Plan*, provided for a high level of development and employment growth in San Francisco. The project would have created 4.8 million square feet of office space, 900,000 square feet of light industrial and institutional space, and 8,700 residential units. The Catellus Development Corporation, the developer of the Mission Bay project, has exercised its right to withdraw from its original development agreement with the City, and is currently considering revisions to the project and the development agreement. Recent public announcements have indicated that the revised Mission Bay proposal is likely to include high density residential land uses north of Mission Creek, with "entertainment retail" uses near the baseball stadium currently proposed in the area between Third Street, Berry Street, and the San Francisco Bay. (Proposition B, passed by San Francisco voters in March, 1996, enables the City to revise its planning and zoning ordinances to allow for construction of a baseball park in this location.)

The present CalTrain station at Fourth and Townsend Streets occupies land that was proposed for commercial development in the *Mission Bay Plan*, and the existing surface rail use therefore conflicts with that Plan. The Peninsula Corridor Joint Powers Board (JPB) has a permanent surface easement on property within the Mission Bay project area that is currently used for passenger railroad purposes.


DOWNTOWN PLAN AREA
RINCON POINT
DOWNTOWN PLAN
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
RINCON HILL
SOUTH BEACH
SOUTH OF MARKET
SHOWPLACE SQUARE
MISSION BAY
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
EXISTING CALTRAIN TERMINAL STATION
BART/MUNI EMBARCADERO STATION
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CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SOUTH OF MARKET PLANNING AREAS

Figure 4.1-2

Rincon Hill. Rincon Hill is a 12-block area located between Folsom Street and the Bay Bridge and Steuart and Second Streets. The City's *Rincon Hill Plan*, originally adopted in July of 1985, contains objectives and policies which propose transforming the industrial area into mixed-use neighborhoods to maximize future residential development. A commercial/industrial designation is proposed for properties around the areas designated residential. The plan promotes retention and adaptive reuse of older structures and encourages infill development of commercial and industrial uses.

South of Market. The South of Market Area (SOMA) encompasses a 350-acre area embracing a diverse economic, social, and cultural community. Primary goals of the City's *South of Market Plan*, which was originally adopted in March 1990, are to protect and facilitate expansion of industrial, artisan, home, and business service and neighborhood-oriented retail and community service activities; to preserve existing housing and to encourage new affordable housing. SOMA remains a valuable City resource for low-cost rental housing and affordable housing. Flexible land use standards are intended to encourage preservation and promotion of the development of affordable live/work units throughout SOMA.

To protect existing industrial/business sectors from commercial office expansion from nearby downtown, the SOMA Plan proposes to contain office uses along the eastern and part of the southern edges of SOMA. The Plan allows existing businesses to remain as nonconforming uses. A high-density, residential mixed use district is planned from Fourth to Sixth and Stevenson to Harrison Streets. Over 2.4 million square feet of office space have been approved by the City for development within this area.

Redevelopment Agency Plans

Rincon Point - South Beach. The ***Rincon Point-South Beach Redevelopment Area Plan*** comprises two non-contiguous subareas formerly characterized by abandoned or underutilized structures, open cargo, storage yards, and parking lots. Major plan elements include mixed-income housing, preservation, and commercial reuse of historic buildings, provision of recreation areas, and specific site plans. Major redevelopment components include the South Beach Harbor Basin, Pier 40 Improvements, South Beach Park, and Rincon Park. Over a dozen project-specific plans are under consideration, as summarized below. Construction has been completed on 1,880 of the 2,500 to 3,000 proposed area residential units as well as 700,000 square feet of commercial space as described below.

- Bayside Plaza - a 90,000 square foot office building at Steuart and Howard Streets.
- Rincon Center - 320 residential units and 532,000 square feet of retail/office space between Spear, Steuart, Mission and Howard Streets.

- Bayside Village - 868 housing units and 15,000 square feet of commercial space between Bryant, Beale, Brannan, and First Streets.

- South Beach Marina Apartments - 414 housing units and 8,000 square feet of commercial space at Townsend and Delancey Streets.

- Embarcadero Triangle (Delancey Street Project) - 177 housing units and 65,000 square feet of commercial space between The Embarcadero, Brannan, and Delancey Streets.

- Steamboat Point - 108 residential units on The Embarcadero at Townsend and King Streets.

Proposals for seven undeveloped sites in the redevelopment area would produce an estimated 900 additional housing units and over 500,000 additional square feet of commercial space, as described below. Phased development is proposed for the period from 1996 to 2006, coordinated with completion of Port of San Francisco improvements and The Embarcadero Roadway and the Muni Metro Extension to Mission Bay.

- A GAP office headquarters of about 450,000 square feet, and 57,000 square feet at the corner of Folsom and Steuart Streets designated for office or housing development.

- 15,000-square-foot site adjacent to the Bay Bridge abutment on Beale and Bryant Streets for mixed use development including 40 housing units and some commercial space.

- 8,000-square-foot site at Delancey and Bryant Streets adjacent to the historic Oriental Warehouse to include 28 loft residential units and several thousand square feet of office commercial space.

- 85,000 square feet at the corner of Delancey and Brannan Streets designated for development of 215 housing units and 5,000 square feet of commercial space.

- Single-story warehouse and three-story commercial building on a 24,000-square-foot site at the corner of Townsend and Colin P. Kelly Jr. Streets, slated for adaptive re-use for commercial purposes.

- Approximately 400 mixed-income condominium units to be developed on a 140,000-square-foot site at Brannan and Delancey Streets, which also includes the historic Oriental Warehouse. The Warehouse is to be rehabilitated for 66 live-work units.

- 67,000 square feet at King and Second Streets, to be developed with approximately 200 housing units.

Transbay Terminal Area. A Policy Advisory Committee representing the transit agencies with operations in the present Transbay Terminal facility, in cooperation with Caltrans and the City of San Francisco, recently studied alternatives for upgrade or replacement of the 60-year old Transbay Terminal at First and Mission Streets. Based on prior studies, the current Transbay Terminal buildings and ramps need extensive renovation to fully meet seismic and modern building codes, and the current layout does not allow for efficient facility operations. The *Transbay Terminal Area Plan* notes that a more efficient, functional terminal design with a smaller "footprint" would support City urban design goals and provide for development of some of the surrounding properties to higher and better uses.

Among alternative designs evaluated as part of this planning effort was a new or upgraded Transbay Terminal on the site of the present terminal or a new terminal on a site between Main and Beale north of Folsom Street.

Proposed Rincon Entertainment Complex. The San Francisco Redevelopment Agency Commission is reviewing a possible waterfront redevelopment project in the blocks bounded by Folsom, Spear, Harrison, and Beale streets. The site is under consideration as a possible entertainment complex (including a multi-plex theater, retail uses, a residential component, and possibly office uses) to be funded from private sources.

Yerba Buena Center. Yerba Buena Center is an 87-acre combined rehabilitation and new development project located between Market, Harrison, Second, and Fourth Streets. The *Yerba Buena Redevelopment Area Plan* proposes a mixed use development scheme around the core Yerba Buena Gardens incorporating major hotel, office, housing, retail, recreational, and cultural uses. In addition, 45 buildings are being rehabilitated, including the historically significant Jessie Street Substation, St. Patrick's Church, and the Mercantile Building. Major elements of the plan which have been completed include the Moscone Convention Center, Center for the Arts/Yerba Buena Gardens and the Museum of Modern Art; three major hotels; 1,800 residential units and commercial retail establishments. Future development plans include a children's entertainment and child care complex, an entertainment/retail complex, a Mexican Museum, a 475,000-square-foot office tower, and two residential/hotel sites.

South of Market Earthquake Recovery Zone. The proposed South of Market Earthquake Recovery Project would address 122 acres between Stevenson and Harrison and Yerba Buena Center and Seventh Streets. Implementation of the housing program would include development of 851 family dwellings, 729 small size units, and 579-single room-occupancy hotel units for a total of 2,159 residential units. The plan would also rehabilitate approximately 200 family and 800 single-occupancy rooms. In addition, 164,890 square feet are proposed for commercial use and 182, 820 square feet for industrial use.

4.2 SOCIOECONOMIC CHARACTERISTICS

Study area socioeconomic character is described in terms of population, employment, housing, income, age, education, and racial composition. The area is experiencing rapid changes in population, housing, and local business activity. The information from the last census (1990) is therefore somewhat dated but has been updated using Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC) data.

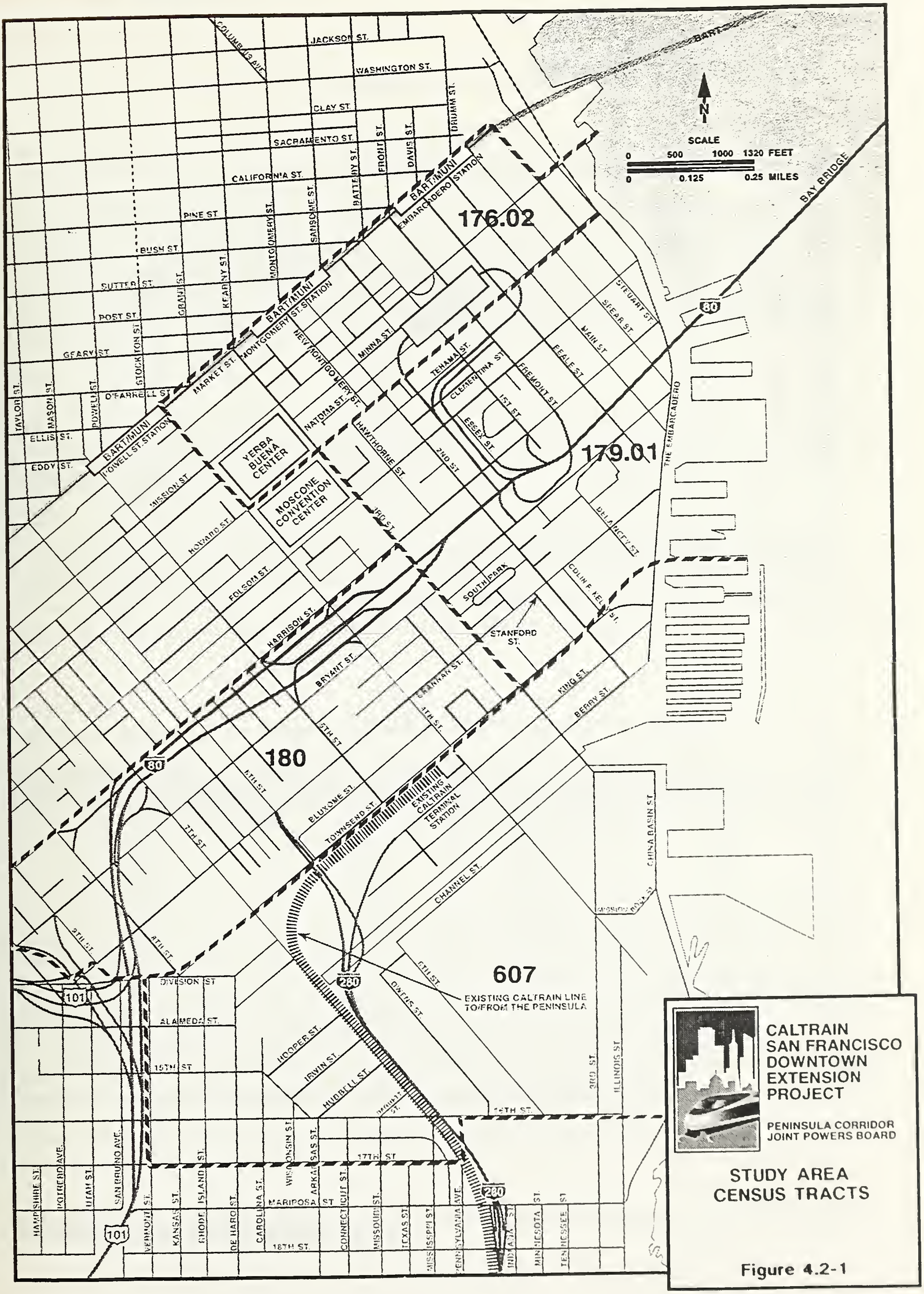
The project area is included within four census tracts covering the area from south of Market Street to 16th and 17th Streets and from the Bay to Vermont and 11th Streets. These tracts are shown in Figure 4.2-1. Each tract consists of two TAZs (MTC Traffic Analysis Zones) except for Tract 607, which includes three TAZs. All information presented herein is at the tract level; the more detailed TAZ data were analyzed when drawing conclusions about the spatial distribution of activity.

4.2.1 Population, Households and Jobs

MTC estimated the 1995 study area population to be 11,481 in 5,266 households. This represents a substantial growth over the 1990 population of 4,250 and 1,825 households. As shown in Table 4.2-1, the area now includes about 1.5 percent of the total estimated San Francisco population of 768,300, while in 1990, the area represented 0.6 percent of the population of 723,960. Household growth has been slightly greater than population growth. Housing is almost entirely multi-family, with 98 percent of all residential units containing two or more dwelling units. Household size in the area is about 1.8 persons, smaller than the 2.4 person average for the city as a whole.

As shown in Table 4.2-2, the area provided an estimated 100,212 jobs in 1995, about an eight percent drop from 1990; this represents about 18 percent of total city employment. This is due to the inclusion of the high employment area between Market and Howard Streets (Census Tract 176.02 contains just under 60 percent of the jobs in the study area).

The decline in area employment reflects the overall decline in employment citywide since 1990. Contrary to this downward trend and a similar decline in the downtown office district, the southern and western portions of the study area (Census Tracts 180 and 607) are estimated to have gained about 700 jobs.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BART/MUNI POWELL ST. STATION
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
SOUTH PARK
STANFORD ST.
EXISTING CALTRAIN TERMINAL STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
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CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT
PENINSULA CORRIDOR
JOINT POWERS BOARD

STUDY AREA
CENSUS TRACTS

Figure 4.2-1

Table 4.2-1
Project Area Population and Households in 1995

Census Tract	Total Population	Total Households	Persons per Household	Percent Single Family Households	Percent Multi-Family Households
176.02	828	422	1.9	0.0%	100.0%
179.01	5,549	2,902	1.8	1.8%	98.2%
180	2,357	778	2.0	8.0%	92.0%
607	2,747	1,164	1.8	0.0%	100.0%
Project Area Total:	**11,481**	**5,266**	**1.8**	**2.2%**	**97.8%**
***San Francisco:**	**768,300**	**313,500**	**2.4**	**32.0%**	**66.0%**
Project Area as % of City:	1.49%	1.68%	76.98%	0.04%	1.64%

* Percent single and multi-family households for City of San Francisco based upon 1990 U.S. Census summary of housing types. Approximately 2% are unclassified.

Source: Metropolitan Transportation Commission, 1995; 1990 U.S. Census.

Table 4.2-2
Project Area Jobs and Employment Status of Residents in 1995

Census Tract	Project Area Jobs	Employed Residents	Percent Workforce Unemployed*
176.02	58,440	627	0.0%
179.01	21,456	3,719	6.0%
180	11,680	1,125	15.1%
607**	8,636	2,159	58.8%
Project Area Total:	**100,212**	**7,630**	**9.6%**
***San Francisco:**	**565,490**	**394,200**	**6.3%**
Project Area as % of City:	17.72%	1.94%	

* Percent of persons in labor force (age 16 years and older) unemployed in 1990, based on U.S. Census. The unemployment rate in 1995 was unavailable. Rates could differ due to changes in economic conditions and population growth in individual zones.

** The 1990 unemployment rate in Census Tract 607 is based on a work force of only 101 individuals resulting in a high unemployment rate.

Source: Metropolitan Transportation Commission, 1995; 1990 U.S. Census.

The median income of area households in 1989 ranged from approximately $21,000 (Tract 180) to $41,500 (Tract 179.01). The percentage of residents below the federal poverty level was 12.4 in 1990, approximately the citywide average (see Table 4.2-3).

Table 4.2-3
Project Area Household Income and Poverty Status in 1989

Census Tract	Median Household Income ($1989)	Percent Below Poverty Level
176.02	$35,125	7.9%
179.01	$41,465	8.9%
180	$20,724	31.2%
607	$37,000	0.0%
Project Area Total	**$20,724 - $37,000**	**12.4%**

Source: 1990 U.S. Census

Auto ownership within the study area is slightly less than for the city as a whole (1.1 autos per household compared with 1.3 citywide; see Table 4.2-4). This likely reflects the small household size and center-city location of the study area, but it points to a potential for high transit usage, similar to or even greater than that of San Francisco residents generally.

Table 4.2-4
Auto Availability of Project Area Households in 1996

Census Tract	Average Autos per Household	"0" Auto Households	%	"1" Auto Households	%	"2" or More Auto Households	%	Total Households	%
176.02	0.6	212	47.9	209	47.2	22	5.0	443	100
179.01	1.3	500	17.0	1,590	54.0	857	29.1	2,947	100
180	0.9	174	21.7	578	72.1	50	6.2	802	100
607	1.0	394	24.8	981	61.7	216	13.6	1,591	100
Project Area Total	**1.1**	**1,280**	**22.1**	**3,358**	**58.1**	**1,145**	**19.8**	**5,783**	**100**
San Francisco:	**1.3**	**77,180**	**24.8**	**124,932**	**40.1**	**109,679**	**35.2**	**311,791**	**100**
Project Area as% of City:		1.66%		2.69%		1.04%		1.85%	

* Estimate prepared as part of demographic database for regional transportation modeling process.

Source: Metropolitan Transportation Commission, Step 27B Forecasts for Regional Transportation Plan, 1994.

In 1990, the median age of study area residents ranged from 31 (Tract 180) to 35 (Tract 607), below the city median of 36 years. The percentages of the very young (less than 16) and elderly (62 or older) were both below the city averages, reflecting the working-age population of the study area (see Table 4.2-5). Over 87 percent of study area residents were high school graduates and 38 percent were college graduates, while the percentages for San Francisco are 78 percent and 35 percent, respectively. Similar to income and employment, educational attainment is highest in the eastern portion of the study area, where about 50 percent of the residents have at least one college degree.

Table 4.2-5
Age and Education of Project Area Residents in 1990

Census Tract	Median Age	Population by Age Group						Educational Attainment	
		Under 16	%	16-61	%	62 & Over	%	% H.S. Grad.	% Col. Grad.
176.02	32.8	3	0.8	338	93.4	21	5.8	90.0	60.0
179.01	31.8	134	5.5	2,203	90.7	92	3.8	94.8	47.8
180	30.7	69	5.3	1,194	91.6	40	3.1	71.1	13.3
607	35.1	10	6.6	126	82.9	16	10.5	100.0	33.7
Project Area Total	**30.7 - 35.1**	**216**	**5.1**	**3,861**	**90.9**	**169**	**4.0**	**87.3**	**37.7**
San Francisco:	**35.7**	**103,382**	**14.3**	**515,197**	**71.2**	**105,380**	**14.6**	**78.0**	**35.0**
Project Area as % of City		0.21%		0.75%		0.16%			

Source: 1990 U.S. Census

Approximately 67 percent of area residents are white/Caucasian, which includes individuals of Hispanic origin. This is higher than the citywide average of about 54 percent. On the other hand, over 20 percent of study area residents are Black/African American, compared with 11 percent citywide. Approximately 34 percent of all area residents were members of minority groups, which may also include Hispanics, compared with about 46 percent citywide. The racial make-up of the study area is shown in Table 4.2-6.

Table 4.2-6
Race and Persons of Hispanic Origin in Project Area in 1990

Census Tract	Total Population		White		Black	
	Number	%	Number	%	Number	%
176.02	362	100	272	75.1	29	8.0
179.01	2,429	100	1,848	76.1	265	10.9
180	1,303	100	575	44.1	570	43.7
607	152	100	131	86.2	7	4.6
Project Area Total:	**4,246**	**100**	**2,826**	**66.6**	**871**	**20.5**
San Francisco: Project Area as % of City:	**723,959**	**100**	**387,783** 0.73%	**53.6%**	**79,039** 1.10%	**10.9**

Census Tract	American Indian		Asian/Pac. Islander		Other		Hispanic Origin*	
	#	%	#	%	#	%	#	%
176.02	1	0.3	55	15.2	5	1.4	13	3.6
179.01	18	0.7	237	9.8	61	2.5	206	8.5
180	11	0.8	88	6.8	59	4.5	201	15.4
607	5	3.3	7	4.6	2	1.3	6	3.9
Project Area Total:	**35**	**0.8**	**387**	**9.1**	**127**	**3.0**	**426**	**10.0**
San Francisco: Project Area as % of City:	3,456 1.01%	0.5	210,876 0.18%	29.1	42,805 0.30%	5.9	100,717 0.42%	13.9

* Included in other racial categories

Source: 1990 U.S. Census

4.2.2 Neighborhoods and Businesses

Neighborhoods

The term "neighborhood" refers to areas defined by population characteristics combined with certain physical features. Criteria include socioeconomic conditions, geography, and institutional settings. Neighborhoods exist where inhabitants share characteristics and residential uses are similar. The varying mixture of land uses and relatively few extensive residential areas in the study area in general limit the formation of neighborhoods, but four distinct neighborhoods have been identified in the project study area, as follows:

Rincon Hill generally extends from Folsom to Bryant Streets and First Street to the Bay and consists of a mix of housing types, including newer, higher density projects such as on Second Street, at Baycrest, etc., and live/work units. The City proposes higher density housing and rezoning for mixed uses; the street system will be rescaled to encourage pedestrian activity.

South Beach is along the Bay and includes the most extensive housing development in the study area. Housing types vary, but apartments dominate with some structures 14-stories high; most are four stories or fewer. Included are the Bayside Village, South Beach Marina, and Steamboat Point apartment complexes. Service retail and commercial uses occupy the ground floor of some of these structures. Smaller households dominate, often consisting of younger professionals working in nearby downtown, accessible by walk and transit. The area has been the focus of redevelopment planning.

South Park is one of the neighborhoods in the project area where families with children still live. South Park could be considered a neighborhood by itself, but is limited in size and appears to be subject to the same development pressures as the surrounding South of Market area. Although the City has a policy to preserve the South Park community, land uses are changing and mixed-use structures and live-work units are under construction.

South of Market, between Bryant and Townsend and Seventh and Second Streets, is very mixed and rapidly changing. Lofts and live/work units converted from older warehouse and industrial/manufacturing buildings are the emerging housing type but not the dominant use. New live-work units have been constructed along the Bluxome and Brannan Street corridors between Third and Seventh Streets. Households tend to be small and composed of younger populations.

Businesses

Business characteristics in the study area are diverse. In the **Downtown** area, office and banking businesses predominate between Market, Spear, Howard, and Third Streets. Major employers in this area include the Federal Reserve Bank, PG&E, Bechtel and Pacific Bell. Some of the businesses located on the blocks along Third Street are connected with the convention and cultural center including the Sheraton Palace Hotel at Market and New Montgomery, and the San Francisco Museum of Modern Art located on Third between Mission and Howard Streets. Southwest of the Transbay Bus Terminal, businesses are primarily service and manufacturing including the City Rubber Stamp Company, United Stamp and Die Company, Rex Games, Inc., and Fritzi Clothing Manufacturers. Entertainment uses (e.g., Club DV8 and the Caribbean Zone Restaurant) are located in this vicinity between Howard and Natoma Streets.

Existing businesses in the western portion of the **Rincon Hill** area include auto repair, printing and graphic shops. Spectrum Gallery Conference Center is located between Harrison and First Streets and Highway 80. Property owned by the U.S. Post Office and Caltrans is located east of Beale Street.

Businesses in the **South Beach** area, which is primarily residential, include light industrial and neighborhood commercial. South Beach Billiards and operations for Gallo Salami are located on Brannan between First and Second Streets.

Businesses in the **South of Market** area are generally small artisan, service or light industrial businesses with less than twenty employees. These businesses are usually dependent on lower rents and are supported by either downtown clients, other ancillary businesses in the SOMA, or freeway access.

Commercial uses in the **South Park** neighborhood area include a mix of small retail, wholesale, artisan, office, and service businesses. A number of artists have established live/work studios in commercial buildings in the area.

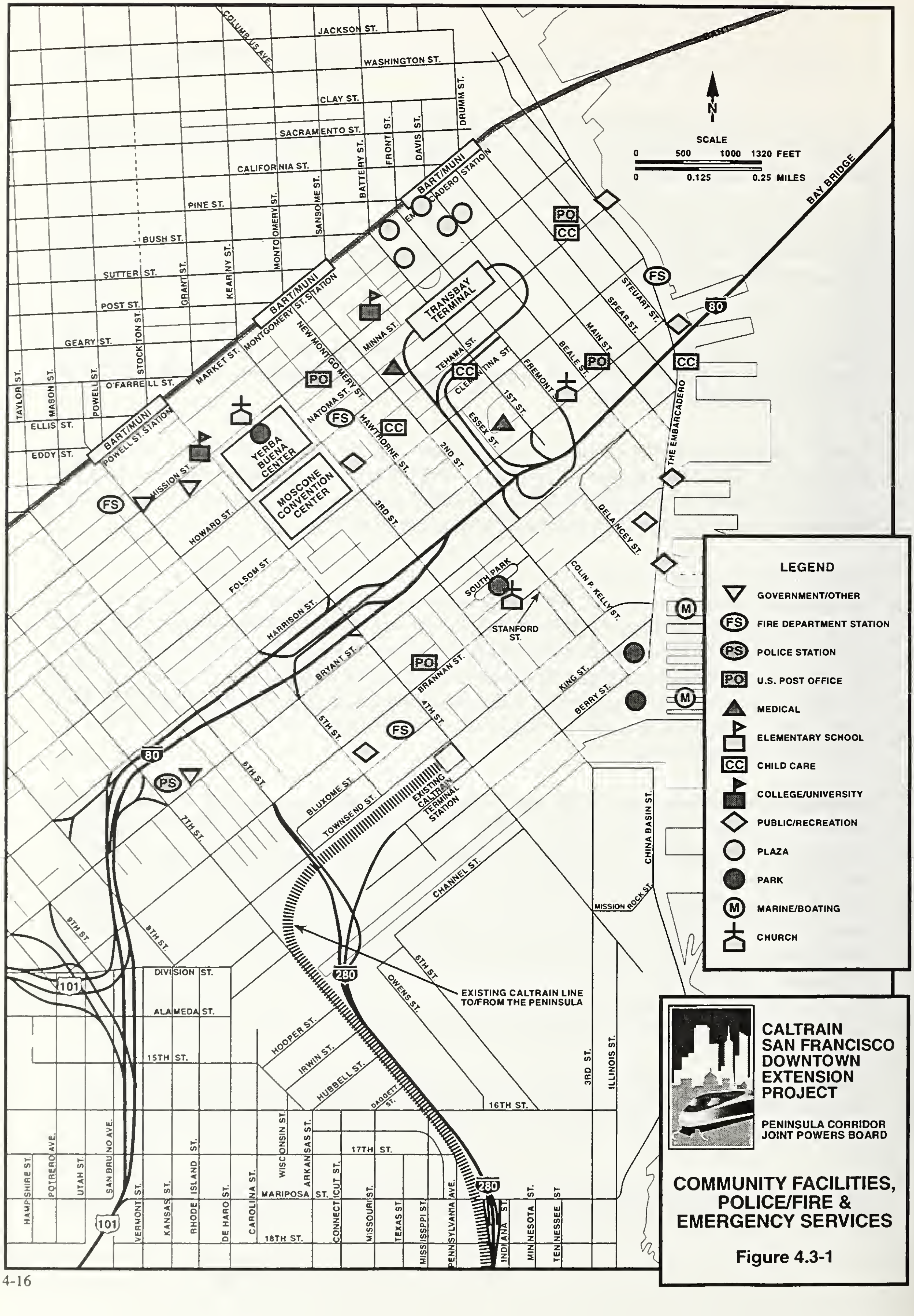
A variety of clothing factory outlets is located in the vicinity of Brannan, Second, Townsend, and Third Streets. Between Third and Fifth Streets, businesses are mostly manufacturers and office-related. The San Francisco Tennis Club is located at Brannan and Fifth Streets. A 24-hour Accessible Storage Facility is located on Townsend at Fifth Street.

West of Fifth towards Seventh Street, between Brannan and Townsend Streets, most of the business activity is supportive of the major design centers including the Flower Market and Showplace Square. These businesses include flower wholesalers/retailers such as Ssilkss and Pottery and Floral World; household furnishing manufacturers such as Rucker Fuller South, Blaze Fireplace and Kitchen King; and importer/exporters including Konwal Co. Inc., Wing Sing Chong Co., Inc., and Kaven Company. Other businesses along Townsend Street include Golden Gate Equipment, Independent Electric Supply Inc., Lock-N-Store, The Mail House, Omarts Inc., and Walden House Printing.

Between Townsend Street and the Channel, in the Mission Bay portion of the project study area, most of the business activity is transportation-oriented or manufacturing. The San Francisco Recreational Vehicle Park and the China Basin Office Building are located between Third and Fourth Streets. The existing CalTrain depot and yard are located between Fourth and Seventh Streets. South of the Channel to Sixteenth Street, between Owens Street and I-280, businesses are transportation-related, including AAA Freight Systems and Super Shuttle. West of Seventh Street, there are manufacturing businesses and maintenance facilities for Greyhound and the Golden Gate Disposal Company.

4.3 COMMUNITY FACILITIES AND SERVICES

Figure 4.3-1 depicts a variety of community facilities in relation to the project study area, including police and fire safety services, medical facilities, parks and other recreational facilities, schools, and churches.


N
SCALE
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LEGEND
GOVERNMENT/OTHER
FS FIRE DEPARTMENT STATION
PS POLICE STATION
PO U.S. POST OFFICE
MEDICAL
ELEMENTARY SCHOOL
CC CHILD CARE
COLLEGE/UNIVERSITY
PUBLIC/RECREATION
PLAZA
PARK
M MARINE/BOATING
CHURCH
BART
BAY BRIDGE
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
TRANSBAY TERMINAL
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
SOUTH PARK
STANFORD ST.
EXISTING CALTRAIN TERMINAL STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
COLUMBUS AVE.
DRUMM ST.
DAVIS ST.
FRONT ST.
BATTERY ST.
SANSOME ST.
MONTGOMERY ST.
KEARNY ST.
GRANT ST.
STOCKTON ST.
POWELL ST.
MASON ST.
TAYLOR ST.
MARKET ST.
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
BLUXOME ST.
TOWNSEND ST.
KING ST.
BERRY ST.
CHANNEL ST.
MISSION ROCK ST.
CHINA BASIN ST.
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HAWTHORNE ST.
2ND ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
TEHAMA ST.
CLEMENTINA ST.
1ST ST.
ESSEX ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
THE EMBARCADERO
DELANCEY ST.
COLIN P. KELLY ST.
80
101
280
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
MARIPOSA ST.
18TH ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
6TH ST.
3RD ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

COMMUNITY FACILITIES, POLICE/FIRE & EMERGENCY SERVICES

Figure 4.3-1

4.3.1 Public and Community Facilities

The U.S. Postal Service maintains two facilities in the study area: a local post office at 460 Brannan Street; and a processing and distribution center at Folsom and Main Streets.

Medical/social welfare facilities include the Seafarers Medical Center, a non-profit clinic at 40 Lansing Street, and the Delancey Street housing complex at Delancey and Brannan Streets on The Embarcadero. Operated by the non-profit Delancey Street Foundation, this four-story complex serves individuals recovering from alcohol and drug-related or other social problems and includes offices of the foundation's moving and transportation company and a restaurant.

Five child care centers are located within the project study area: Discovery Treehouse Educational Center at 220 Spear Street; Healthy Environmental Child Development Center at 95 Hawthorne Street; Kinderhaven Children's Center at 474 The Embarcadero; South of Market Child Care Inc. at 366 Clementina Street, and PG&E building at Mission and Beale.

4.3.2 Safety and Emergency Services

Police

The San Francisco City Police Department is responsible for general law enforcement in the study area, with both auto and foot patrols daily. Two police stations serve the study area: Southern Station at 850 Bryant street, between Sixth and Seventh Streets, the same building as the Hall of Justice; and Potrero Station at 2300 Third Street, which is responsible for the area south of Berry and west of Sixth Streets. Muni has a 50-officer force (part of the City Police Department) focusing specifically on transit security. Other law enforcement agencies include the San Francisco County Sheriff's Department; Amtrak (contract operator of the CalTrain service) whose officers police CalTrain vehicles and patrol station and parking areas from bases at Seventh and King Streets and Diridon Station in San Jose; California State Highway Patrol (which oversees the Transbay Terminal); and BART police, who patrol the Embarcadero and Montgomery BART stations within the project area.

AC Transit and Golden Gate Transit also have personnel to monitor their facilities in the Transbay Terminal.

Fire and Rescue

The San Francisco Fire Department maintains Station Number 8 at 36 Bluxome Street in the study area. Fire Station Number 35 and Fire Boat Number 1 are located along The Embarcadero between Folsom and Harrison Streets. Station Number 1 at 416 Jessie Street (temporarily relocated to 676 Howard Street during seismic retrofit) serves portions of the study area as well. The fire department also provides "first response" emergency service which includes paramedics responding to calls within five minutes on average; however, the department does not transport individuals to medical facilities. The fire department provides fire and emergency service to BART and CalTrain facilities located within the City and to the Transbay Terminal.

A salt water pump station, located at 698 Second Street at the corner of Townsend Street, provides bay water for fire fighting in the event the normal fresh water system fails.

The primary emergency services response agency is the Paramedic Division of the San Francisco Department of Public Health, providing its own ambulance and paramedical services within the City and County of San Francisco, which maintains a 911 emergency call response system. The Paramedic Division has an eight-minute response time standard for life-threatening emergencies.

Disaster Preparedness

The San Francisco Mayor's Office of Emergency Services plans and coordinates emergency services in the event of a natural disaster. An emergency command center is located at 1003a Turk Street, outside the project area.

4.4 PARKLANDS, SCHOOLS AND CHURCHES

Figure 4.3-1 shows the locations of project area parklands, schools, and churches, as described in this section.

4.4.1 Parklands and Recreational Facilities

The project area includes two city parks, an urban garden center, a municipal marina, public waterfront areas, and several public plazas.

South Park, encircled by South Park Avenue between Second and Third Streets, is an approximately one-acre, wooded neighborhood park with pedestrian sidewalks and benches and a children's play area.

South Beach Park is an approximately five-acre city park located along The Embarcadero between King Street and China Basin. The park is being developed as part of the South Beach Harbor complex and is scheduled for completion in 1998-99 pending relocation of the Port of San Francisco's corporation yard. South Beach Park adjoins the South Beach Harbor, a 690-boat berth marina for small boats.

Yerba Buena Gardens, located in Yerba Buena Center, Central Block 2 between Mission and Howard Streets, is an integrative network of urban gardens serving to connect the surrounding cultural, entertainment, and convention-oriented land uses. Gardens in the Center include the 5.5 acre Esplanade which consists of an outdoor performance stage surrounded by a grass meadow;

a Sister City Garden; two cafes with outdoor terraces; and a waterfall which leads to a Martin Luther King, Jr. Memorial. The East Garden, located near Third Street, forms a public park commons between three major cultural buildings: the Center for the Arts, the Performing Arts Theater, and the San Francisco Museum of Modern Art.

The proposed Rincon Point Park site, approximately three acres located along The Embarcadero at Folsom Street, is scheduled for development as part of the Rincon Point Redevelopment Plan.

With the reconstruction of The Embarcadero roadway between Market and King Streets, improvements have been made along the Bay that provide increased public access and a continuous pedestrian walkway (Herb Caen Way) between South Beach Harbor, Market Street, and points north.

To the south and west of South Beach Harbor is China Basin, a channel extending from San Francisco Bay inland to just east of Seventh Street and I-280. The basin provides berths for sailboats, houseboats, and other moderately sized craft in the channel area west of Fourth Street. Along the south bank of the basin, just outside of the project area, is a linear community park with a pedestrian way and community garden plots.

Within the commercial office district in the vicinity of the Transbay Terminal are a number of privately developed plazas open to the public. Some are at street level; others are elevated and accessible by stairs or escalators.

Near the CalTrain station are two private recreational facilities: the San Francisco Recreational Vehicle Park at 250 King Street and the San Francisco Tennis Club at 645 Fifth Street.

4.4.2 Schools and Churches

No public or private schools grades K-12 are presently located in the study area. A two-acre school site has been reserved in the Mission Bay project area at Indiana and Sixteenth Streets; the site is proposed to be developed in response to the educational needs of the future Mission Bay community.

Golden Gate University's main campus is located on Mission between Ecker, Second, and Stevenson Streets. The complex includes administrative offices, classrooms, meeting facilities, and auditoriums. Approximately 4,000 full- and part-time undergraduate and graduate students attend. The downtown campus of San Francisco City College is located in the study area at 4th and Mission Streets. Recently, the Academy of Art College has occupied property on New Montgomery Street at Mission Street and at Howard Street.

There are two churches in the study area: Apostleship of the Sea at 399 Fremont Street (at Harrison), which also provides temporary housing, and St. Patrick's at 756 Mission (between 3rd and 4th Streets). The Grand Oriente Filipino Masonic Temple is located at 95 Jack London Street, south of South Park between Second and Third Streets.

4.5 FISCAL/ECONOMIC CHARACTERISTICS

Total revenues for the City and County of San Francisco in Fiscal Year 1994-95 were approximately $1.3 billion. Property taxes, which accounted for an estimated $341 million of that total, are levied on the assessed value for all privately-owned property. The property tax rate levied is 1.163 percent. Of the collected property tax, approximately 71 percent is allocated to the City and County of San Francisco's general fund; the remaining revenues accrue to debt service, special revenue funds, and special districts.

Business taxes accounted for approximately $165 million. The Payroll Expense tax is levied on payroll expenses of persons or associates doing business in San Francisco, while the Business Tax is a gross receipts tax on all business activities performed by persons or associates in San Francisco. Businesses in San Francisco calculate both taxes and pay which ever is higher to the City/County.

The State of California collects sales tax at a rate of 7.25 percent of total sales receipts. Of this amount, 1.0 percent is redistributed to cities and 0.25 percent to the counties. In San Francisco, another 1.25 percent is levied and apportioned among BART, the San Francisco Transportation Authority, and the San Francisco Public Finance Authority. The total sales tax in San Francisco is therefore 8.5 percent.

Licenses, fines, and penalties totaled an estimated $13 million; other major revenue sources included grants, subventions, and allocations totaling $459 million.

4.6 AIR QUALITY

This section describes regional, state, and federal air pollutant standards, and information regarding existing air quality in the project area and vicinity.

4.6.1 Federal, State, and Local Air Quality Standards

The federal Clean Air Act of 1970 resulted in the adoption of federal air pollutant standards, known as National Ambient Air Quality Standards (NAAQS), for pollutants including carbon monoxide (CO), ozone (O3), sulfur oxides (SOx), nitrogen oxides (NOx), and fine particulate matter (PM_{10}). Areas exceeding federal NAAQS are identified and designated as nonattainment areas. The state air pollutant standards are known as the California Ambient Air Quality Standards (CAAQS), and are generally more stringent than the NAAQS. Federal and state standards are shown in Table 4.6-1. Existing compliance (i.e. area "attainment") with the NAAQS and CAAQS for criteria pollutants is discussed below, along with existing pollutant concentrations.

Table 4.6-1
Federal & State Ambient Air Quality Standards

Pollutant	Averaging Time	National Standard	California Standard
Ozone	1 hour	0.12 ppm*	0.09 ppm
Carbon Monoxide	1 hour 8 hour	35 ppm 9 ppm	20 ppm 9.0 ppm
Nitrogen Oxides	1 hour annual	--- 0.053 ppm	0.25 ppm ---
Sulfur Dioxide	1 hour 24 hour annual	--- 365 $\mu g/m^3$ 80 $\mu g/m^3$	0.25 ppm 0.04 ppm ---
Suspended Particulates (PM_{10})	24 hour annual	150 $\mu g/m^3$ ---	50 $\mu g/m^3$ 30 $\mu g/m^3$

* ppm = parts per million; $\mu g/m3$ = micrograms per cubic meter

Source: Bay Area Air Quality Management District, *BAAQMD CEQA Guidelines*, Table A-1, pg. A-2, April 1996.

The project site is within the Bay Area Air Basin (BAAB) which comprises the nine-county Bay Area. Air quality in the BAAB is regulated primarily by the Bay Area Air Quality Management District (BAAQMD), which is responsible for regulating stationary source emissions and submitting federally- and state-required documentation to the California Air Resources Board (ARB). The ARB regulates mobile source emissions and is responsible for reviewing state-required documentation submitted by regional agencies such as the BAAQMD, and for submitting federally-required documents to the US Environmental Protection Agency.

Regionally, the BAAQMD has standards for project-related air contaminant emissions levels which it considers significant. These standards, expressed in terms of pounds per day, are presented in Table 4.6-2.

4.6.2 Existing Air Quality and Regional Attainment Status

The transport and concentration of air pollutants are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. The San Francisco Bay Area is in a large basin enclosed by hills that open into valleys. This topography creates the potential to trap and accumulate air pollutants, and combines with variable weather conditions, airflow, and wind speeds to cause differing air pollution concentrations.

Table 4.6-2
BAAQMD Thresholds for Project-Related Contaminant Emissions

Pollutant	Lbs per Day From Project Operations
Reactive Organic Gas	80
Nitrogen Oxides	80
PM_{10}	80

Source: Bay Area Air Quality Management District, *BAAQMD CEQA Guideline*, Table 3, pg. 15, April 1996.

Existing air quality conditions in the study area are reflected by measurements taken at BAAQMD monitoring stations. Data from four monitoring stations along the CalTrain corridor were used: the 4th Street monitoring station in San Jose, the San Carlos monitoring station in San Jose, the Redwood City monitoring station in Redwood City, and the Arkansas Street monitoring station in San Francisco. Table 4.6-3 presents five years of data at each station to provide pollution trends. The table also indicates federal and state standards for these pollutants, and where these pollutant standards have been exceeded.

According to the BAAQMD, the BAAB is in attainment with national standards for ozone, carbon monoxide (eight-hour, rural areas), carbon monoxide (one-hour), nitrogen dioxide, sulfur dioxide, and PM_{10}. It is designated non-attainment for carbon monoxide (eight-hour) for urban areas; but the BAAQMD has applied for attainment status, since BAAQMD monitoring stations have recorded one exceedence of the national standard since 1991. With respect to California standards, the BAAB has attainment status for carbon monoxide, nitrogen dioxide, and sulfur dioxide. It is designated non-attainment for Ozone and PM_{10}.

4.6.3 Regulatory Setting

As amended in 1990, the federal Clean Air Act provides the current framework for air conformity. The Clean Air Act defines conformity to mean:

> Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards . . .

Table 4.6-3
Air Quality Standards, Ambient Measurements and Violation Days

Pollutant	State Standard	Federal Standard	Year	San Jose - 4th Street		San Jose - San Carlos		Redwood City		San Francisco - Arkansas	
				Maximum Level	Violation Days	Maximum Level	Violation Days	Maximum Level	Violation Day	Maximum Leve	Violation Days
Ozone 1-hour	0.09 ppm	0.12 ppm	1990	0.12	0/0	0.13	5/1	0.08	0/0	0.06	0/0
			1991	0.10	0/0	0.08	0/0	0.08	0/0	0.05	0/0
			1992	0.12	0/0	0.11	1/0	0.09	0/0	0.08	0/0
			1993	0.11	0/0	0.13	4/0	0.10	1/0	0.08	0/0
			1994	0.11	3/0	0.10	1/0	0.08	0/0	0.06	0/0
Particulates (PM10) 24 hours	50 ug/m3	150 ug/m3	1990	165	25/1	134	5/0	137	8/0	165	12/1
			1991	153	26/1	111	14/0	90	12/0	109	15/0
			1992	106	8/0	112	9/0	80	7/0	81	9/0
			1993	92	8/0	93	5/0	76	5/0	69	5/0
			1994								
Total Suspended Particulates	No State Standard	150 ug/m3	1990	243	3	163	1	171	4	156	1
			1991	145	0	185	2	111	0	93	0
			1992	nm	na	107	0	107	0	nm	na
			1993	nm	na	114	0	116	0	nm	na
			1994	nm	na					nm	na
Carbon Monoxide 1-hour	20 ppm	35 ppm	1990	17.0	0/0	12.0	0/0	12.0	0/0	8.0	0/0
			1991	15.0	0/0	13.0	0/0	11.0	0/0	9.0	0/0
			1992	10.0	0/0	11.0	0/0	12.0	0/0	8.0	0/0
			1993	13.0	0/0	13.0	0/0	10.0	0/0	7.0	0/0
			1994	12.0	0/0	11.0	0/0	12.0	0/0	6.0	0/0
Carbon Monoxide 8-hour	9.1 ppm	9.5 ppm	1990	11.3	5/5	8.6	0/0	5.9	0/0	5.6	0/0
			1991	10.8	1/1	8.0	0/0	6.5	0/0	6.5	0/0
			1992	7.3	0/0	7.6	0/0	4.8	0/0	6.4	0/0
			1993	6.6	0/0	6.0	0/0	5.8	0/0	5.1	0/0
			1994	8.8	0/0	6.6	0/0	5.4	0/0	4.4	0/0
Nitrogen Oxides	.25 ppm - 1 hr	0.05 ppm - annual	1990	0.15	0/0	nm	na	0.12	0/0	0.03	0/0
			1991	0.14	0/0			0.12	0/0	0.04	0/0
			1992	0.10	0/0			0.10	0/0	0.04	0/0
			1993	0.12	0/0			0.09	0/0	0.04	0/0
			1994	0.11	0/0			0.11	0/0	0.02	0/0
Sulfur Dioxide	0.05 ppm - 1 hr	0.14 ppm - 24 hr	1990	nm	na	0.08	0	nm	na	5.3	0
			1991			0.03	0			6.3	0
			1992			0.04	0			13.3	0
			1993			0.02	0			5.0	0
			1994							13.9	0

ppm - parts per million
ug/m3 - micrograms per cubic meter
nm - no measurement
na - not applicable
Violation days - number of days exceeding State/Federal standard

Source: California Air Resources Board. Air Quality Data, 1990-94

T4-6-3.wk4

Section 176 of the Clean Air Act specifies that no federal agency may approve, support, or fund an activity that does not conform to the applicable implementation plan. In late 1993, the EPA promulgated final rules for determining conformity of transportation plans, programs, and projects. These final rules, codified in 40 CFR 93A, govern the conformity assessment for the proposed project.

The BAAQMD is responsible for adopting the area's implementation plan, or SIP. The BAAQMD's *1982 Bay Area Air Quality Plan*, referred to as the 1982 Plan, first indicated how the BAAQMD would implement federal air quality requirements. With adoption of the *Bay Area '91 Clean Air Plan*, the 1982 Plan was updated to also implement the requirements of the California Clean Air Act of 1988. As required by the California Clean Air Act and subsequent amendments, the BAAQMD also prepared the *1994 Clean Air Plan Update*. In connection with its September 1993 request for redesignation of the Bay Area as a federal ozone attainment area, the BAAQMD prepared and submitted to the EPA a Maintenance Plan describing how the Bay Area would maintain its attainment of the federal ozone standard. EPA approval of the redesignation request in May 1995 also included approval of the Maintenance Plan. The 1982 Plan, as amended, and the Maintenance Plan constitute the federally approved SIP for the Bay Area.

The Metropolitan Transportation Commission (MTC) is responsible for establishing that the Bay Area Regional Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP) conform to the SIP. In April 1991, the MTC adopted Resolution No. 2270, which contains the conformity assessment procedures and criteria which are currently used to review transportation projects. More recently, the MTC submitted revised conformity procedures for approval by the EPA. Upon EPA approval for inclusion in the SIP, these conformity procedures will supersede Resolution 2270 and the conformity procedures contained in the 1982 Plan.

4.7 NOISE AND VIBRATION

4.7.1 Existing Noise Environment

The noise environment of the study area, like that in most urban areas, is dominated by automobile and truck traffic noise, with traffic on the Bay Bridge most pervasive in areas closest to the Bridge. Other noise sources in the project area include small aircraft flyovers and normal community activity.

A noise survey was conducted in July 1995 to document the existing noise environment in the study area and to provide data needed for accurate estimation of how the noise environment would change under project alternative conditions. Long-term (24-hour) noise monitoring sites were located at apartment and condominium complexes and the site of a planned residential high-rise. Short-term (30 minutes) measurement sites were located near sensitive receptors along the proposed alignments and near roadways which are the primary contributors to ambient noise levels. Vibration measurements were taken at these short-term sites as well.

Figure 4.7-1 indicates the location of the noise measurement sites and Table 4.7-1 presents results of the 24-hour and short-term surveys.

Table 4.7-1
Existing Noise Measurements

Location	Type	Start		Results	
		Date	Time	Ldn	Leq
L1: Bayside Village	24-hour	7/24/95	11:00	72	--
L2: Bay Crest Condominiums	24-hour	7/24/95	12:00	76	--
L3: Delancey Street	24-hour	7/25/96	13:00	71	--
L4: South Beach Marina	24-hour	7/25/95	14:00	64	--
L5: Oriental Warehouse	24-hour	7/26/95	15:00	67	--
S6: Parking Lot Near Bayside Village	30-minutes	7/26/95	16:52	72*	69
S7: South Beach Marina	30-minutes	7/26/95	10:08	67*	64
S8: Bayside Village, Bryant Street	30-minutes	7/26/95	16:56	71*	68
S9: Parking Lot, Planned Natoma Mews Development	30-minutes	7/26/95	18:18	60*	57
S10: Bay Crest Condominiums, Beale St.	30-minutes	7/27/95	14:05	75*	72

* Ldn at short-term sites estimated as Leq + 3 dBA.

Source: Harris Miller Miller & Hanson, April 1996.

The results are typical for an urban area, and are presented in terms of the Leq (Equivalent Sound Level), which is the standard measure for traffic noise, and Ldn (Day-Night Equivalent Sound Level), which is a good representation of community noise levels.[1]

As shown in Table 4.7-1, existing Ldn measurements in the study area range from 60 to 76 dBA. The highest noise levels were measured at sites directly exposed to the Bay Bridge traffic. The lowest levels of noise exposure were measured at the South Beach Marina Apartments in a location completely shielded from the bridge. Although the Natoma Mews site is just south of

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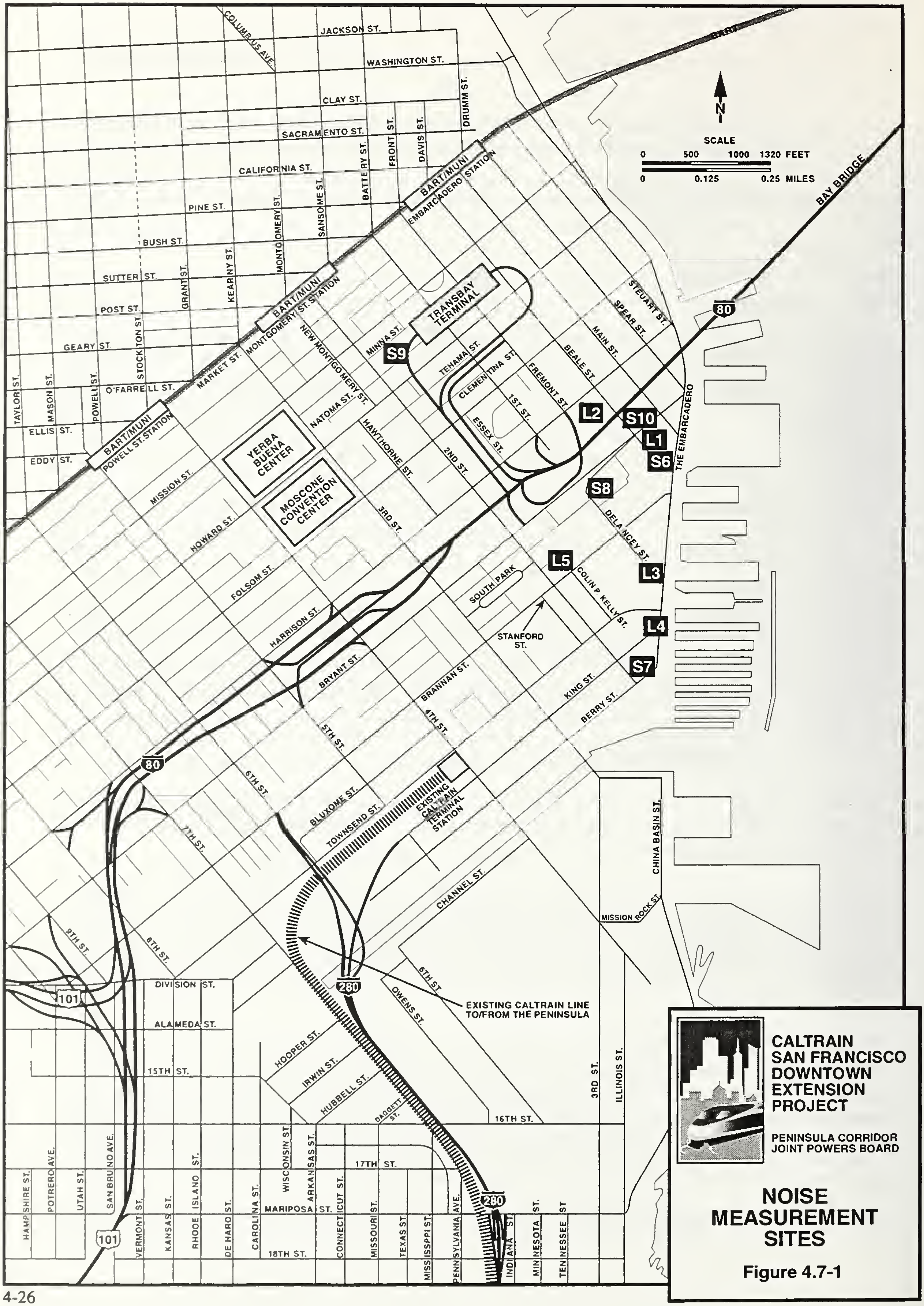
[1] Leq is a measure of noise exposure over time which is referred to as "equivalent" since it is equivalent to the level of a steady sound, which over a referenced duration and location, has the same A-weighted sound energy as fluctuating sound. Durations of one hour and one day are commonly used. Ldn is a measure of noise exposure over a 24-hour period, with an adjustment for nighttime noise to account for people being more sensitive to nighttime noises. Both measurements are presented here in terms of dBA, or A-weighted decibels, which are logarithmic units of measurement filtered to approximate human hearing.


N
SCALE
0
500
1000
1320 FEET
0
0.125
0.25 MILES
BART
BAY BRIDGE
JACKSON ST.
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
GEARY ST.
O'FARRELL ST.
ELLIS ST.
EDDY ST.
COLUMBUS AVE.
DRUMM ST.
DAVIS ST.
FRONT ST.
BATTERY ST.
SANSOME ST.
MONTGOMERY ST.
KEARNY ST.
GRANT ST.
STOCKTON ST.
POWELL ST.
MASON ST.
TAYLOR ST.
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
BART/MUNI POWELL ST. STATION
MARKET ST.
MISSION ST.
HOWARD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
TOWNSEND ST.
BLUXOME ST.
KING ST.
BERRY ST.
CHANNEL ST.
TRANSBAY TERMINAL
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
MINNA ST.
NATOMA ST.
NEW MONTGOMERY ST.
HAWTHORNE ST.
TEHAMA ST.
CLEMENTINA ST.
ESSEX ST.
1ST ST.
2ND ST.
3RD ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
THE EMBARCADERO
DELANCEY ST.
COLIN P KELLY ST.
SOUTH PARK
STANFORD ST.
S9
S10
S6
S8
S7
L1
L2
L3
L4
L5
80
101
280
EXISTING CALTRAIN TERMINAL STATION
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
CHINA BASIN ST.
MISSION ROCK ST.
DIVISION ST.
ALAMEDA ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
MARIPOSA ST.
HOOPER ST.
IRWIN ST.
HUBBELL ST.
DAGGETT ST.
OWENS ST.
6TH ST.
3RD ST.
ILLINOIS ST.
HAMPSHIRE ST.
POTRERO AVE.
UTAH ST.
SAN BRUNO AVE.
VERMONT ST.
KANSAS ST.
RHODE ISLAND ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
PENNSYLVANIA AVE.
INDIANA ST.
MINNESOTA ST.
TENNESSEE ST.
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NOISE MEASUREMENT SITES

Figure 4.7-1

Mission Street near several high traffic volume streets where Ldn would normally range between 65 to 70 dBA or higher, the noise levels are relatively low due to the shielding effect of large buildings around the site.

4.7.2 Existing Vibration

Ambient vibration measurements were performed simultaneously with the noise measurements at the five short-term measurement sites. The major existing sources of ground-born vibration are traffic on local streets, particularly large buses and trucks, and mechanical equipment associated with buildings. Table 4.7-2 presents results of the vibration survey in terms of the range of RMS vibration velocity expressed in decibels (VdB in this analysis).[2] Typical levels were in the 40 to 50 VdB range, with the highest level at 58.

Table 4.7-2
Summary of Ambient Vibration Surveys

Location	Typical background Vibration	Vibration Sources
L1: Parking Lot near Bayside Village	35-40 VdB	Buses and Trucks
S7: South Beach Marina	35-40 VdB	Buses and Trucks
S8: Bayside Village, Bryant	40-50 VdB	Cars turning into buildings, trucks, Bay Bridge traffic
S9: Parking Lot, Planned Natoma Mews Development	35-40 VdB	Cars
S10: Bay Crest Condominiums, Beale Street	40-43 VdB	Trucks, Bay Bridge traffic, cars

Vibration levels are in terms of RMS * vibration velocity in decibels with a reference quantity of 1 μinch/second

* RMS (root-mean-square) amplitude represents the average energy over a short time interval, typically one second is used to evaluate human responses to vibration. RMS is considered the best available measure of potential human annoyance from ground vibration, and differs from peak particle velocity (PPV) which is used to define the thresholds for potential building damage from

Source: Harris Miller Miller & Hanson, April 1996.

The threshold of vibration perception for most humans is around 65 VdB. Levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels in excess of 80 VdB are often considered unacceptable. There is some relationship between the frequency and duration of vibration events, and their annoyance for building occupants. For urban transit systems with 10 to 20 trains per hour throughout the day, limits for acceptable levels of ground-borne vibration in residential areas are usually between 70 and 75 VdB.[3]

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[2] RMS (root-mean-square) amplitude represents the average energy over a short time interval -- typically one second is used to evaluate human responses to vibration. RMS is considered the best available measure of potential human annoyance from ground vibration, and differs from peak particle velocity (PPV) which is used to define the thresholds for potential building damage from construction vibration. PPV represents the maximum instantaneous peak in the velocity of an object's vibratory motion. VdB is used in this analysis to denote a decibels.

In addition to the measurements of ambient vibration, a special test was performed to characterize how local geologic conditions affect vibration propagation in the study area. One of the main goals of this test was to determine whether geologic conditions in the study area are likely to result in efficient vibration propagation. Ground vibration from trains is usually not a problem at distances over 100 feet from the tracks. However, there are situations where vibration from trains has exceeded normal acceptability limits at distances up to 500 feet or more from rail lines, apparently because of efficient vibration propagation. It is suspected, but unproven, that areas with shallow bedrock or soils that have high concentrations of clay are prone to this type of efficient propagation.

The vibration propagation tests performed for the study area used a weight dropped onto a load cell to cause a ground vibration pulse. The impact force of the weight was measured with the load cell, and accelerometers were used to measure the vibration pulse at distances from 25 to 200 feet away. No evidence of unusually efficient vibration propagation was documented. Thus it is not expected that vibration will travel a substantial distance from the CalTrain Extension tracks.

4.8 GEOLOGY AND SEISMICITY

This section describes the geology of the project area and the susceptibility of site soils to seismically induced hazards.

4.8.1 Geologic Setting

The project area, and the San Francisco Peninsula in general, is located in the Coast Ranges geomorphic province, although the dominant northwesterly trend of ridges and valleys characteristic of the Coast Ranges is somewhat obscured within the City of San Francisco, except for features such as Russian and Telegraph Hills. The regional topography is characterized by relatively rugged hills formed by Jurassic- to Cretaceous-aged bedrock, surrounded by low flat-lying areas which are underlain by Quaternary sedimentary deposits. Bedrock consists of highly deformed and fractured sedimentary rocks of the Franciscan assemblage. Locally, Franciscan bedrock contains large through-going shear zones such as the City College and Fort Point -- Potrero Hill -- Hunters Point shear zones.

From a geotechnical standpoint, the study corridor is divided into two general areas: the portions of the study area that are located bayward of the historic shoreline, and portions of the study area on the land side of that line. The portions of the study area that are bayward of the historic (c.

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[3] See Table 5.8-1 for FTA Vibration Impact Criteria.

1848) shoreline represent areas reclaimed by filling former marshes and estuaries of the Bay, and include the former Yerba Buena Cove, South Beach, and Mission Bay. (See Figure 4.8-1.) Today these areas include much of the Financial District, South of Market, and Mission Bay areas of San Francisco. Soils in these areas are generally characterized by the presence of soft and compressible Bay Mud, under the surficial fill placed when these areas were reclaimed in the late 1800s and early 1900s. The depth of these sediments varies substantially depending on the position of the area of interest relative to the old shoreline. Fill materials also vary, and include clay, dune sand, rubble, building demolition debris, buried ships, and other materials.

The portion of the project area that is inland from the historic shoreline is underlain by Franciscan bedrock at the surface or at shallow depths, although Bay Mud extends landward of the 1848 shoreline near the Transbay Terminal and in the southern portion of the project area between Third and Seventh streets in areas of former marshlands. Quaternary sediments overlie bedrock throughout the project area except for Rincon Hill, which is the only surface exposure of Franciscan bedrock in the project area. Bedrock is less than 10 feet below ground surface near Townsend and Second streets.

Groundwater is between 7 and 10 feet below ground surface in the flat-lying portions of the project area, which corresponds to elevations of -3 to -10 feet relative to City and County of San Francisco Datum (8.6 feet above mean sea level).

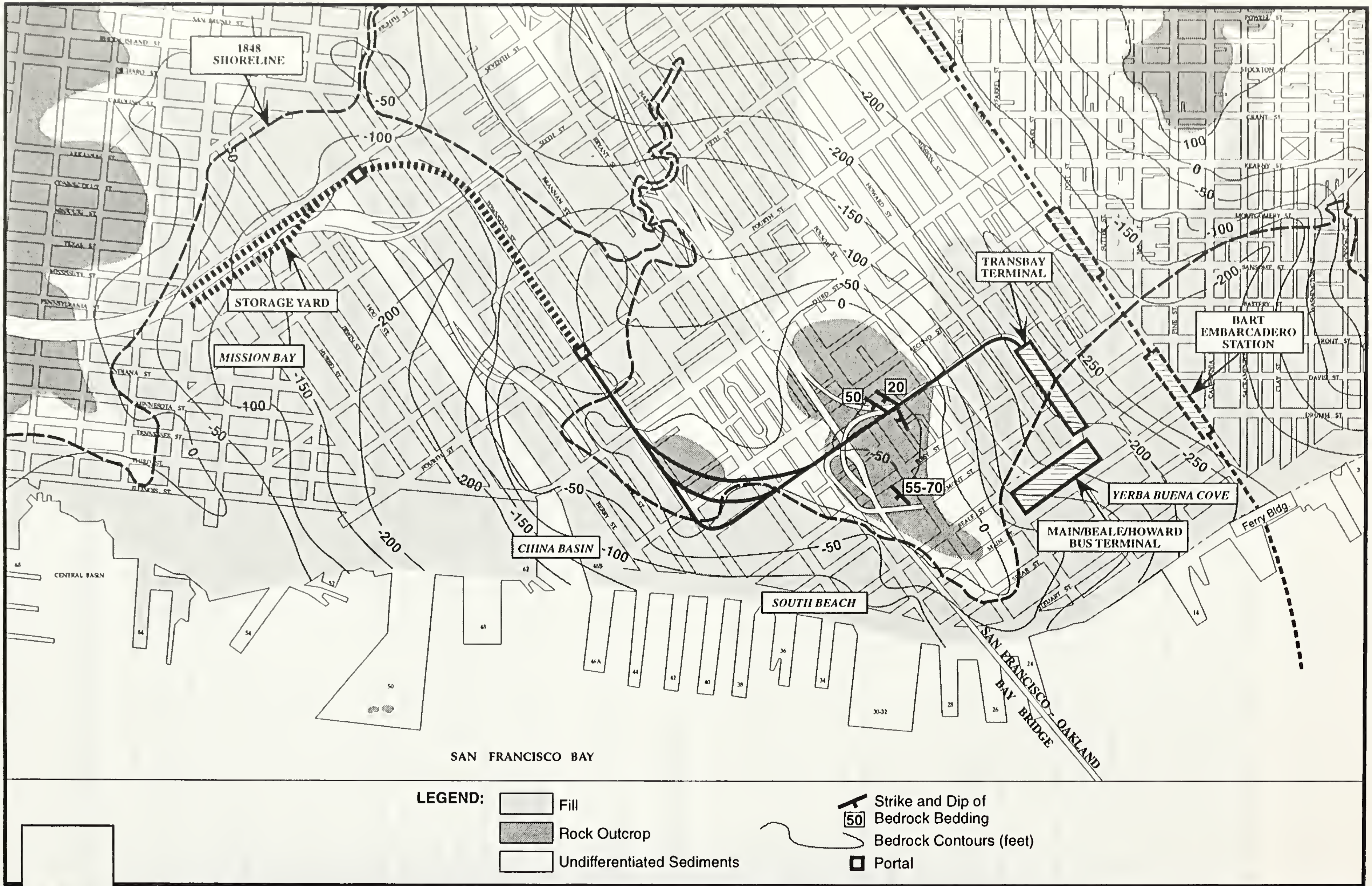
4.8.2 Seismic Setting

The project area is seismically active, and ground shaking from earthquakes occurs periodically. Active faults in the Bay Area are illustrated in Figure 4.8-2.

The San Andreas and Hayward faults have the highest slip rates and are the most active of any faults in the Bay Area. The San Andreas Fault, which is approximately 8.5 miles west of the project site, was the source of the 1906 magnitude 8.2 earthquake and the 1989 magnitude 7.1 (Loma Prieta) earthquake. The Hayward Fault, which lies approximately 9 miles east of the project site, was the source of the 1836 and 1868 magnitude 6.8 earthquakes. The Calaveras Fault, which is approximately 22 miles east of the project site, was the source of a 1911 magnitude 6 earthquake and a 1984 magnitude 6.2 earthquake.

Other important earthquake sources that are capable of producing large magnitude earthquakes are the San Gregorio, Rodgers Creek, and Greenville fault zones.

No known faults cross the project alignment; however the faults shown in Figure 4.8-2 may subject the study area to strong ground shaking. Estimates of peak ground acceleration from an earthquake on the San Andreas or Hayward fault within the study area range from 0.2g to 0.5g. Ground failure hazards during an earthquake can include settlement and liquefaction. During the 1989 Loma Prieta earthquake, ground deformation in the project area consisted of settlement,


1848 SHORELINE
STORAGE YARD
MISSION BAY
CHINA BASIN
SOUTH BEACH
TRANSBAY TERMINAL
BART EMBARCADERO STATION
YERBA BUENA COVE
MAIN/BEALE/HOWARD BUS TERMINAL
Ferry Bldg.
SAN FRANCISCO – OAKLAND BAY BRIDGE
SAN FRANCISCO BAY
CENTRAL BASIN
50
20
55-70
100
0
-50
-100
-150
-200
-250
LEGEND:
Fill
Rock Outcrop
Undifferentiated Sediments
Strike and Dip of Bedrock Bedding
Bedrock Contours (feet)
Portal

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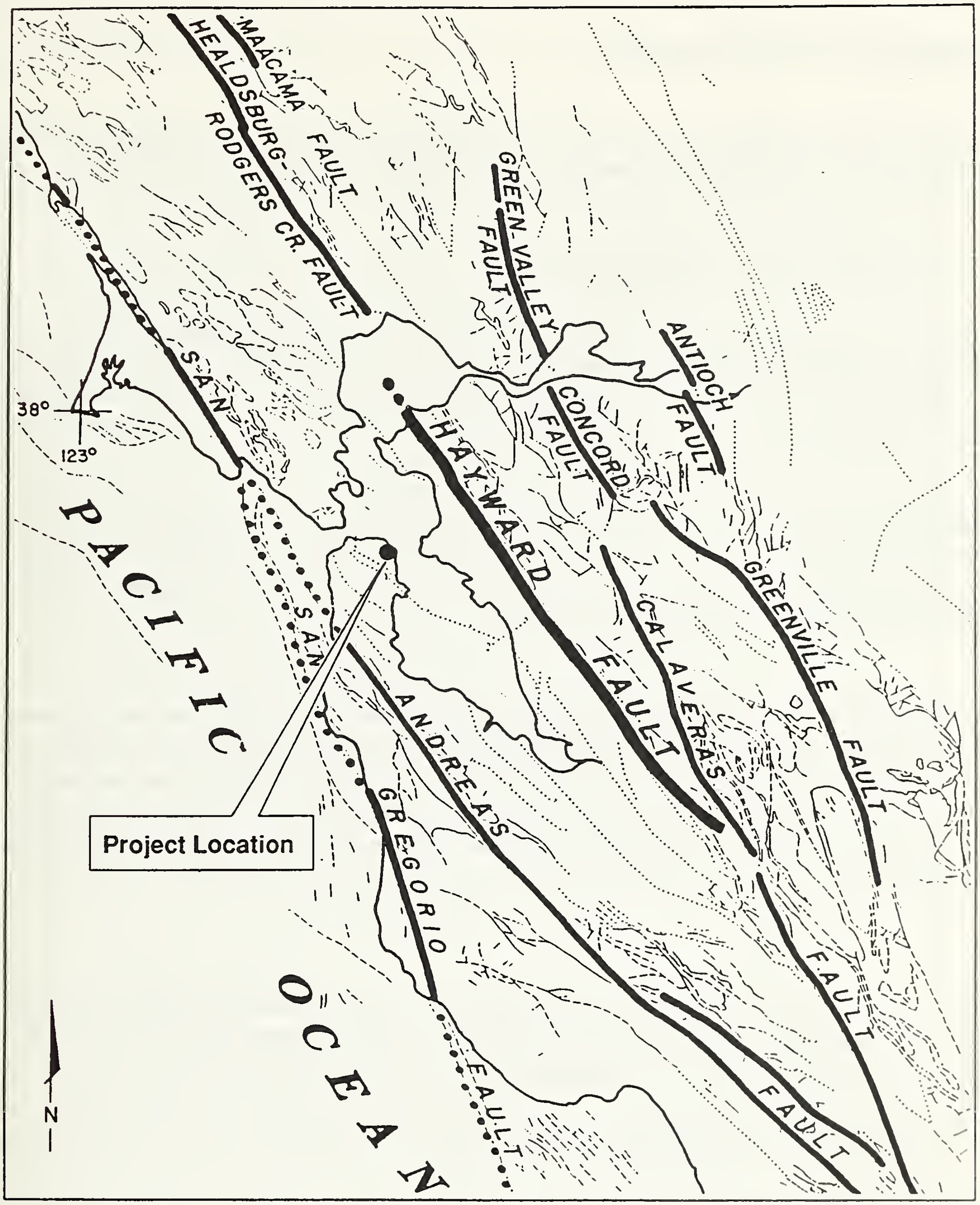
GENERALIZED GEOLOGY OF THE STUDY AREA

Figure 4.8-1


MAACAMA FAULT
HEALDSBURG-RODGERS CR. FAULT
GREEN VALLEY FAULT
ANTIOCH FAULT
CONCORD FAULT
SAN
HAYWARD FAULT
CALAVERAS FAULT
GREENVILLE FAULT
38°
123°
PACIFIC OCEAN
SAN ANDREAS FAULT
SAN GREGORIO FAULT
FAULT
FAULT
Project Location
N

Source: California Division of Mines and Geology, Special Publication 78 (1987)

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LOCATIONS OF ACTIVE FAULTS IN THE SAN FRANCISCO BAY AREA

Figure 4.8-2

ground cracking, and/or sand boils. These features were observed between Beale Street and The Embarcadero from Market to Harrison Streets, and from Fourth to Ninth Streets between Mission and King Streets.

4.9 VEGETATION AND WILDLIFE

Portions of the project area lie within reclaimed areas formed by filling former marshes and estuaries of San Francisco Bay, including Mission Bay, South Beach and Yerba Buena Cove. Today, except for South Park and landscaping associated with recent residential developments in the South Beach/Steamboat Point area, the vicinity of the proposed project is generally paved with concrete and asphalt. No natural habitat for biological plant, animal, or bird species remains.

Although the project area lies adjacent to the San Francisco Bay, construction would occur some 600 feet or more from the shoreline and no project alternatives would require any filling of or construction within wetlands or Bay waters, and none would affect water quality. No effects on San Francisco Bay bird species are anticipated.

These findings are consistent with the previous environmental studies conducted in the area, including the Draft EIS/EIR for Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure, published by the City of San Francisco, Caltrans, and the Federal Highway Administration in 1995, which addresses an area similar to the present project area. The U.S. Fish and Wildlife Service indicated that no adverse effects on endangered species of wildlife and plants or their habitats are expected from the proposed improvements (see 2 May 1996 letter in Appendix F).

4.10 WETLANDS

The present China Basin Channel is not a naturally occurring tidal creek but the remains of the former Mission Bay. The entire site, like the project area in general, has been altered through extensive urban development or landscaping. No wetlands remain.

4.11 WATER RESOURCES

4.11.1 Ground Water Resources

The occurrence of groundwater in the project area is related to the nature of shallow soil and bedrock. In the fill areas, groundwater occurs at depths of 2 to 10 feet below ground surface, and the elevation of groundwater corresponds with the level of San Francisco Bay. In areas underlain by alluvial soils and shallow bedrock, which generally correspond to the higher elevations in the project area, groundwater is typically found at depths greater than 20 to 30 feet.

Groundwater occurring within fill soils in the project area is expected to be shallow and, therefore, susceptible to contamination from past industrial land use, placement of contaminated fill material, and releases from underground storage tanks (UST's). Groundwater quality may be further degraded by seawater intrusion along The Embarcadero waterfront. The presence of chemical constituents such as petroleum hydrocarbons and chlorides may affect how water generated during construction dewatering will be handled and disposed. The City and County of San Francisco and the California Regional Water Quality Control Board do not consider water in this area suitable for potable supplies, but consider it potentially suitable for industrial purposes, although no known uses are reported within the project area.

The quality of the groundwater in the fill soils is generally poor. Brackish conditions exist in most of the project area due to the proximity of the Bay, where tidal fluctuations are generally in the range of six feet. Seawater intrusion resulting from tidal fluctuations has been known to occur several hundred feet from the Bay and tidal channels (e.g., China Basin Channel). The presence of chlorides in the groundwater can restrict the discharge of dewatering effluent to the City's combined sewer system because of chloride content limits imposed by the San Francisco Department of Public Works (DPW), which operates the sewage treatment plant.

Groundwater encountered in the fill areas of the alignment may contain varying concentrations of petroleum hydrocarbon contaminants, primarily because the South of Market area contains one of the highest densities of USTs in the City (See discussion of Hazardous Wastes, Section 4.17). Hydrocarbon contamination may affect dewatering programs, possibly requiring treatment of pumped groundwater prior to discharge to the storm sewers. Although polynuclear aromatic hydrocarbons (PAH) and lead are present in the fill soils, groundwater has not typically been found to have been affected by these contaminants.

4.11.2 Surface Water Resources

The relative density of impermeable surfaces within the project area is on the order of 95 percent. Most of the area is completely paved and developed and no surface water bodies exist with the exception of China Basin Channel and San Francisco Bay. All stormwater runoff in the project area is captured by the City's combined sewer system, with one exception: storm sewers along the bayward portion of The Embarcadero discharge directly to the Bay.

The sewer system is served by an 18-foot by 18-foot box sewer which runs along The Embarcadero, King, and Berry Streets to a pump station at Berry and Seventh Streets. From the pump station, the water is transported to a sewage treatment plant near Phelps and Jerrold Streets. Data on water quality were not available for the project area; however, due to the heavily urbanized nature of the project area, runoff water quality is expected to be poor.

4.12 FLOODPLAINS

The City/County of San Francisco does not participate in the Federal Emergency Management Agency's floodplain identification program, and no floodplains have been identified within San Francisco.

4.13 COASTAL ZONE

The McAteer-Petris Act of 1965, as amended, grants the San Francisco Bay Conservation and Development Commission (BCDC) permit authority over San Francisco Bay and over lands located within 100 feet of the Bay shoreline. BCDC's management plan for the San Francisco Bay, The *San Francisco Bay Plan* has been certified by the Federal Department of Commerce as the Coastal Zone Management Program for the San Francisco Bay Segment of the California Coastal Zone Management Program pursuant to the Federal Coastal Zone Management Act (CZMA). Under the CZMA, federal projects and local projects that utilize federal funding or require federal approval must, to the maximum extent practicable, be consistent with a State's coastal management program if the project would affect the coastal zone, and BCDC's authority may extend inland more than 100 feet.

CalTrain project construction would in all cases be 600 feet or more from the shoreline, and would not have any effects on shoreline access or water quality. No formal finding of consistency with the Coastal Zone Management Plan (i.e., the San Francisco Bay Plan) would therefore be required.

4.14 UTILITIES

The Department of Public Works, City and County of San Francisco, maintains a combined storm drain and sanitary sewer system. Sewer types within the study area include vitrified clay pipe (VCP); older iron/steel pipe (ISP); very old brick collector sewers; medium-sized reinforced concrete (RC) interceptor sewers, and large RC consolidation sewers that carry sewage and storm water from downtown to the Southeast Treatment Plant. Sewers range in size from 8-inch VCP to 17.5-foot square RC.

Municipal water supplies for the City and County of San Francisco are collected from Sierra Nevada watersheds. The City stores water in the Crystal Springs Reservoir via the Hetch Hetchy Aqueduct. The San Francisco Water Department maintains an interconnected grid of service lines throughout the area, and the San Francisco Fire Department maintains a second parallel system of auxiliary water lines exclusively for supplying fire hydrants (with potable water) and with provision for supplying salt water from the Bay for fire fighting. Water lines are primarily cast iron (CI) and range in size from 8-inch to 20-inch.

The City and County of San Francisco owns and operates the Hetch Hetchy water and power hydroelectric generating facilities which provide power to San Francisco via Pacific Gas and Electric Company's (PG&E) electrical transmission and distribution system. A capacity of 339 kilowatts (kW) is provided by the three Hetch Hetchy electricity generating facilities in the Tuolumne River watershed, of which approximately 107 kW are used by the City and County of San Francisco. Electricity service is provided primarily from underground RC vaults through a network of buried conduit and duct banks. PG&E maintains older low-pressure CI natural gas lines from four to 16 inches in diameter, as well as new, high-pressure plastic lines from two to four inches in diameter. Consumption of energy within the City and County of San Francisco has historically been greatest during the winter months, while areawide demand usually peaks in the summer.

Communication networks interlace the project area as well; most communication equipment is owned and operated by Pacific Bell and routed underground similar to electrical service. The vaults range from 2-foot by 4-foot pull boxes to large electrical rooms 30 feet by 20 feet by 12 feet. Sprint, MCI, AT&T and cable TV companies also maintain underground fiber-optic cable routes in the project area.

Some overhead electrical and communication facilities still exist in the southerly portions of the project area. The density of underground utility facilities generally increases with proximity to Market Street.

4.15 ELECTROMAGNETIC FIELDS

Electrical systems produce both electric and magnetic fields. Electric fields result from the strength of the electric charge, while magnetic fields result from the motion of the charge. Together, these fields are referred to as electromagnetic fields (EMF). EMFs are invisible, non-ionizing, low frequency radiation. Electric and magnetic fields occur naturally and are produced by all living organisms. The concern over EMF exposure generally pertains to man-made sources of electromagnetism and increased levels of exposure that interfere with other systems and may have adverse biological impacts. Under extreme conditions (that is, the presence of intense electrical fields), EMF hazards can include shock and burn. Such conditions are rare. The possible health and biological effects of the more common levels of EMF exposure are under much study and intense debate. There is no emerging consensus on acceptable levels and duration of EMF exposure.

Electric field strength is measured in units of volts per meter (V/m) and is greater the higher the voltage. Field strength deteriorates rapidly with distance from the source. Magnetic field strength has several units of measure; the most commonly used are the milligauss (mG) and the microTesla (mT). Ten milligauss equal one microTesla. Direct current (DC) produces stronger EMFs than alternating current (AC). Magnetic fields also deteriorate with distance but readily pass through most objects. Magnetic fields are typically the radiation of concern when evaluating EMFs. Consequently, EMF strength is measured in terms of milligauss.

Examples of EMF intensities include the following:

Overhead Power Transmission Line -- 32-57 mG (utility workers)
Household Appliances -- 8-165 mG at 27 cm (12 inches)
Computer Video Display Terminal -- 1.6-3.9 mG at 35 cm (16 inches)[4].

Strong fields are not associated with the normal environment and the operation of electrically-powered passenger trains. Measurements of average magnetic fields for electrically-powered rail vehicles have ranged from approximately 400 mG at 110 cm (43 inches) from the vehicle floor to 1,500 mG at floor level. For comparison, in the natural environment, the earth's static magnetic field varies from 300 mG at the equator to over 600 mG at the magnetic poles.

Neither the federal government nor the State of California has set standards for EMF exposure. The Federal Drug Administration, Federal Communications Commission, Department of Defense and Environmental Protection Agency are considering federal guidelines. The California Department of Education has established a policy of "prudent avoidance" for the location of schools in the vicinity of high voltage power lines. Several countries and other states have standards for electrical field exposures, but not for EMFs from electric trains. The International Radiation Protection Association has proposed limiting electric field exposure to five kV/m and magnetic fields to 2,000 mG.

4.16 HISTORIC AND CULTURAL RESOURCES

Potential historical and archaeological resources in the project area have been identified and evaluated in accordance with applicable regulations and guidelines. This section reports on the identification of such resources.

4.16.1 Regulatory Setting

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their activities and programs on historic properties. Section 110 of the Act lays out affirmative agency responsibilities with respect to historic properties and establishes the National Register of Historic Places (NRHP) for identifying and listing historic properties of importance to the nation, the states, and local communities.

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[4] Safety of High Speed Guided Ground Transportation Systems, EMF Exposure Environments Summary Reports. Federal Railroad Administration, August 1993.

Guidelines for implementing Section 106 requirements are promulgated by the Advisory Council on Historic Preservation (ACHP) in "Protection of Historic Properties" (36 CFR Part 800). These guidelines require agencies to comply also with other federal laws related to historic preservation, including the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1979; and Executive Order 11593 (1971), addressing "Protection and Enhancement of the Cultural Environment." Other agency-specific legislation requires consideration of the impacts of federal actions on cultural resources. Transportation projects must comply with the provisions of Section 4(f) of the Department of Transportation Action of 1966.

The State of California references cultural resources in the California Environmental Quality Act (CEQA-- PRC Division 13, Sections 21000-21178); archaeological and historical resources are specifically treated under Sections 21083.2 and 21084.1, respectively. California PRC 5020.1 through 5024.6 (effective 1992) creates the California Register of Historical Resources and sets forth requirements for protection of historic cultural resources.

The City and County of San Francisco Landmarks Preservation Advisory Board recommends designation of historic structures and districts to the City Planning Commission and the Board of Supervisors. Designated resources are listed in Articles 10 and 11 of the City Planning Code. City-designated historic resources are presumed to be historically or culturally significant for purposes of CEQA, as are resources that are listed on or determined eligible for listing on the National Register of Historic Places and/or the California Register of Historic Resources.

4.16.2 Areas of Potential Effects (APE)

Two Areas of Potential Effects (APEs) were delineated through consultation with FTA and the State Historic Preservation Officer (SHPO). An APE for archaeological resources was defined as the extent of proposed construction for the CalTrain project (i.e., the project "footprint"). An APE for historical architectural resources was defined to include the first right-of-way of parcels fronting along the proposed project right-of-way.[5] Surveys of cultural resources within the APE consisted of an archaeological resource survey and an historical architectural survey (including a field survey and research).

An Historic Property Survey Report (HPSR), which identifies and summarizes potentially eligible historic and cultural resources within the APE, was submitted to the SHPO. The SHPO concurred in these determinations of eligibility on October 2, 1996. A copy of the SHPO's letter of concurrence is included in Appendix F.

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[5] The APE originally was 100 feet on either side of the proposed project right-of-way. At an August 7, 1996 meeting with Clarence Caesar of the SHPO, the decision was made to include only structures facing the right-of-way.

The following sections summarize information and National Register eligibility determinations contained in the HPSR; they also include available information regarding designations and eligibility at the local and State level.

4.16.3 Archaeological Resources

Research and field investigations for archaeological resources were conducted in May and June of 1996, and included review of historical maps and written sources, review of archaeological and historic site listings from the Historical Resources Information System Northwest Information Center at Sonoma State University, and a windshield survey of area structures and topography to determine the potential for productive field reconnaissance. A vast majority of the APE is covered by buildings and pavement, and the precise location, integrity and research potential of any archaeological resources that are present cannot be determined without subsurface excavation. Once detailed construction plans have been prepared and approved for the project, it will be possible to assess more precisely potential impacts to archaeological resources in the project area. An archaeological research design and treatment plan incorporating pre-construction testing would be developed in consultation with the SHPO and the ACHP. The significance of an archaeological site is typically based on its potential to provide information important in prehistory or history, not on any intrinsic value in terms of style, materials, form of construction, or association with specific persons or events. Archaeological resources encountered before or during project construction would be evaluated in accordance with the plan by a qualified archaeologist to determine their National Register eligibility. (See Chapter 5 for more information on the archaeological treatment plan.)

Prehistoric Archaeology

No known prehistoric archaeological sites are documented within the APE; however, unidentified sites may exist. If buried cultural materials are unearthed during construction, work would be halted in the vicinity of the find until a qualified archaeologist could assess its significance. If human remains are unearthed during construction, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. The California Native American Heritage Commission would be contacted regarding Native American artifacts as appropriate.

Portions of the APE are characterized by dry, relatively flat terrain above Bay waters and marshlands, and could very well contain prehistoric cultural deposits similar to those already documented in the South of Market region. The sensitive areas include: the Steamboat Point section of Townsend Street, from approximately 4th Street to the foot of Malakoff Hill at 3rd Street; the Colin P. Kelly/Essex Streets Alignment south of Rincon Hill, between Brannan and Bryant Streets, as well as north of Rincon Hill, between Folsom Street and the Transbay

Terminal; and the Transbay Terminal/Bus Terminal Site, from the Colin P. Kelly/Essex Streets Alignment, east to the original shoreline at approximately Fremont Street.

The southern portion of the Mined Tunnel Segment that transects the Malakoff Hill location, from Townsend Street to Bryant Street, is not regarded as sensitive. The hilly terrain would not have been a prime location for prehistoric cultural activity; also, the hill was leveled during historic times, thus obliterating any cultural deposits that could have been present. The same negative sensitivity conclusion is drawn for the Rincon Hill portion of the Mined Tunnel Segment, between Bryant and Folsom Streets, which was also leveled during historic City development.

Historic Archaeology

Cultural remains from historic periods are likely to occur within the APE, and historic periods within the study area have been defined as follows: Spanish Period, 1769-1822; Mexican Period, 1822-1848; Early American Period, 1848-1868; the Metropolis of the West/Southern Pacific Railroad Era, 1868-1906; and Post-Earthquake San Francisco, 1906-1950. While much of the study area remained under water until after the Mexican Period, cultural remains from the Early American Period and later are known to occur within the greater South of Market area, and include maritime-related deposits such as piers, wharfs, shipyard and boat repair locations, and sunken or abandoned nineteenth-century vessels, and other resource types such as commercial, industrial, and residential sites.

Twenty-four known or potential historic archaeological resources have been identified within or immediately adjacent to the project alternative alignments. These resources are listed by date and location in Table 4.16-1. Because they are under ground and nearly all covered by buildings or pavement, the precise location and relative integrity of many of these sites have not been determined, and thus their status with regard to National Register eligibility is also undetermined. As previously stated, archaeological resources encountered prior to or during construction would be evaluated in accordance with the Archeological Research Design and Treatment Plan (ARDTP) to determine their National Register eligibility.

4.16.4 Historic Architectural Resources

Research and field investigations for architectural resources were conducted between February and June of 1996, and included preliminary and background research, property-specific research, and a field survey. Preliminary research was obtained from the Historic Properties Directory of the Office of Historic Preservation, the files of the Foundation for San Francisco's Architectural Heritage, other standard published sources, and previous architectural surveys conducted for the I-280 Transfer Concept Program, and Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure. Background research was conducted in the library of the consultant and the Environmental Design Library of the University of California at Berkeley. Documents available at the San Francisco Planning Department were also reviewed. Property-

Table 4.16-1
Known or Potential Historic Archaeological Resources in the Area

No.	Resource Description	Date	Approximate Location
1	The dumps or "Dumpville"	1870s-1890s	Both sides of the south end of Mission Creek Channel
2	Shipbuilding yards of Alex Hay and Boole & Beaton	1880s	South side of Berry Street between 6th and 7th Streets
3	Cut Basalt Block Pavement	1871-1910	Sections of King and 6th Streets
4	The Long Bridge	1863-1865	4th street, between Brannan and Berry Streets
5	Wharf and shipbuilding area	1850s	Townsend Street near 4th Street
6	Shipyards of John G. North, Domingo Marucci, and Patrick Henry Tiernan	1853-1860	3rd, 4th, and King Streets
7	San Francisco Glass Works	1865-1870	SW corner of Townsend and Ritch Streets
8	Pacific Oil and Lead Works	1866-1927	Between Townsend, King, 2nd and 3rd Streets
9	San Francisco Gas Light Company/ Citizen Gas Co.	1864-1887	West side of 2nd Street, between Townsend and Berry Streets
10	Tichenor's Marine Railway	1851-1896	East of 2nd Street, between Townsend and King Streets
11	Pacific Mail Steamship Company/ Pacific Mail Steamship Dock, Pier 40	1867-1908	Between Delancey, Brannan, and Townsend Streets, and the east side of Delancey Street to Berry Street
12	Unidentified sloop or schooner/Life C. Watts Shipyard/store, saloon and boarding house/ Industrial Ironworks	1850-1899 1877-1899	Beale Street, just north of Folsom Street
1[illegible]	Unidentified ship or brig	1850s	East of Beale Street, between Folsom and Howard Streets
14	Risdon Iron Works	1867-1899	Between Howard, Main, Folsom, and Beale Streets
15	Vulcan Iron Works/Pacific Iron Works/Empire Foundry	1851-1896	Between 1st, Natoma, Beale and Minna Streets
16	Shipbuilding yards of Andrew Grass, A. Johnson, Adinijah Parsons, Albert M. Glidden et al.	early 1860s	Between Beale and Main Streets, south of Mission Street
17	The ship *Trescott* or *Callao*	1852-1860s	NE corner of block bounded by Mission, Main, Howard, and Beale Streets
18	Main Street Wharf	1854-1870	Either side of Main Street
19	CA-SFr-116H Chinese Fishing Village/Wilson Tardiff and Bells shipbuilding	1852-1865	South Beach Shoreline, including the block bounded by Bryant, 1st, Brannan, and Beale Streets
20	Happy Valley Gold Rush Camps/ Dwellings and Commercial Structures	1849-1906	Block bounded by Folsom, 2nd, Mission, and 1st Streets

Table 4.16-1, continued
Known or Potential Historic Archaeological Resources in the Area

No.	Resource Description	Date	Approximate Location
21	CA-SFr-27H Gold Rush era garbage dump	1849	North end and east side of block bounded by Beale, Mission Fremont, and Market Streets.
22	The Storeship *Autumn*	Early 1850s	North of Market Street and east of Davis Street.
23	The Storeship *Calleo*	Early 1850s	Intersection of Market, Pine, and Davis Streets.
24	The Storeship *Bryon*	Early 1850s	Market and Beale Streets.

Source: David Chavez & Associates; De Leuw, Cather & Company, September 1996

specific research utilized Sanborn maps, building permit applications at the San Francisco Department of Building Inspection, library sources, and materials at the Foundation for San Francisco's Architectural Heritage. City directories, block books, *Edwards Abstract*, Sanborn Maps, and Realdex, were among the sources consulted.

There are 207 buildings within the APE. Of these, 50 are listed or determined eligible for listing in the National Register, either individually, or as part of the Rincon Point/South Beach Historic Warehouse-Industrial District (identified locally as the South End Historic District). Individual resources listed on and determined eligible for listing on the National Register, either individually or as a contributor to a historic resource or district, are identified in Table 4.16-2 and are subject to Section 106 procedures and consultation described in the regulatory framework discussion above.

Summary descriptions of these eligible properties are provided in the following paragraphs. Detailed descriptions for all potential eligible properties are provided in the HPSR. Chapter 5 of this Draft EIS/EIR provides a description of each eligible property that would be affected by the proposed project.

Transbay Transit Terminal

The Transbay Transit Terminal at 425 Mission Street occupies land extending from Mission Street on the north to Natoma Street on the south. The terminal building crosses Fremont Street on the east and First Street on the west. It is an 870-foot long flat slab with a 230-foot long central pavilion. The construction is reinforced concrete faced with California granite. Designed by Timothy Pfleuger, Arthur Brown, Jr., and John J. Donovan, consulting architects, and built in 1939, the Transbay Terminal was the “functional successor to the Ferry Building. When electric

Table 4.16-2
Historic Architectural Resources within the APE Listed On or Determined Eligible for The National Register [1]

Building Name & Address	Date	NR Status
H.S. Crocker Company 230-40 Brannan Street	1907	3D
Hawley Terminal 274 Brannan Street	1923	3D
Rosenberg Bros. Dried Fruit Warehouse 275 Brannan Street	1904	1S, 3D
Crane Company Building 301-21 Brannan Street	1939	3D
G.E. Warehouse 355-61 Bryant Street	1907	3D
Haas Cabinet Works 64-66 Clementina Street	1913	3S
B&W Engraving Company 52 Colin P. Kelly Street	1907	2S2, 3D
Marine Electric Company 342-56 Howard Street	1907	3S
H. L. Cook Building 401 Howard Street	1917	3S
Martin Building 527-29 Howard Street	1906	3S
Mercedes Oil Company 531-33 Howard Street	1906	3S
PG&E Building 245 Market Street	1923-25	1S
Transbay Terminal 425 Mission Street	1939	2S2
Terminal Plaza Building 440-54 Mission Street	1920	3S
Brizard & Young Sheet Metal Works 72 Tehama Street	1906	3S
Hooper's South End Warehouse 64-72 Townsend Street/62 Colin P. Kelly St.	1874	2S2, 3D
Mercado Latino 101-09 Townsend Street (710 2nd St.)	1913	3D
Rohr Building 111-13 Townsend Street	1911	3D
Southern Pacific Warehouse 115-13 Townsend Street (126 King)	1902-04	1S,3D
Zytron 130 Townsend Street	1910	3D
Stevenson & Son, Inc. 135 Townsend Street	1910	3D
Clinton Fireproofing Co. (L. A. Norris owner) 136 Townsend Street	1913	3D
Haslett Warehouse 139 Townsend Street	1920	3D
Clinton Construction Co. (L.A. Norris owner) 144-46 Townsend Street	1922	3D
Winchester-Simmons Co. 148-54 Townsend Street	1922	3D
L.A. Norris Co 162-164 Townsend Street	1919	3D

Note: [1] Subject to final determination of SHPO.

National Register Status codes are as follows:
1S -- Separately Listed on the National Register
2S1 -- Determined Eligible for Listing by the Keeper of the Register
2S2 -- Determined Eligible for Listing by Consensus of the SHPO and a Federal Agency
3D -- Contributor to a District that Appears Eligible
3S -- Appears Eligible for Separate Listing

Table 4.16-2, continued
Historic Architectural Resources within the APE
Listed On or Determined Eligible for The National Register [1]

Building Name & Address	Date	NR Status
California Electric Light Company 166-78 Townsend Street	1888	3D
California Wine Association 180 Townsend Street	1906	3D
350-60 Townsend Street W.P. Fuller & Co. Warehouse	1906	3S
Marwedel Building 76-80 First Street	1905	3S
Van Emon Elevators 231-35 First Street	1913	3S
Phillips & Van Orden Building 234-46 First Street	1930	3S
Mark Lally Co. Building 235-37 Second Street	1912	3S
Schmidt Lithograph ("The Clocktower") 461-67 Second Street	1909-38	3D
L.A. Scoop Company 599 Second Street	1923	3D
Felton Co./Haslett Warehouse 601-15 Second Street	1909	3D
South End Warehouse 625-35 Second Street	1905	1S,3D
Crane Co. Building 634 Second Street	1926-27	3D
640 Second Street	1925-26	3D
B.F. Goodrich Rubber Co. 650 Second Street	1922	3D
Moore & Scott Iron Works 670-80 Second Street	1913	3D
California Warehouse 675-99 Second Street	1882/ 1911	1S, 3D
SFFD Pump Station No. One 698 Second Street	1910-11	1S,3D
MJB Warehouse 685-89 Third Street	1906	3D
American Radiator Co. Building 690-98 Fourth	1926	3S
Holbrook, Merrill & Stetson Co. 685 Sixth Street	1920-21	3S
Pacific Hardware & Steel Co. 700-68 Seventh Street	1904-05	3S
Bay Bridge & Associated Ramps	1937	2S2
Rincon Point/South Beach Industrial-Warehouse District		3D
Path of Gold Street Lights Market Street	1917	3S

Note: [1] Subject to final determination of SHPO.

National Register Status codes are as follows:
1S -- Separately Listed on the National Register
2S1 -- Determined Eligible for Listing by the Keeper of the Register
2S2 -- Determined Eligible for Listing by Consensus of the SHPO and a Federal Agency
3D -- Contributor to a District that Appears Eligible
3S -- Appears Eligible for Separate Listing

Source: Michael Corbett, Dames & Moore; De Leuw, Cather & Company, September 1996

trains began arriving over the Bay Bridge, use of the Ferry Building dropped to almost nothing overnight, and the Transbay Terminal took over as the primary gateway to the city."[6]

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[6] Caltrans, 1995.

The Transbay Terminal is considered as a contributing element of the NRHP-eligible San Francisco - Oakland Bay Bridge. Its present owner is the California Department of Transportation. Its current use is for commuter and inter- and intra-regional bus transportation.

The Transbay Terminal retains integrity with respect to exterior elevations, areas, and building materials; configuration of interior space; site; and the ramps that connect the building to the San Francisco - Oakland Bay Bridge. (The integrity of the loop ramp relates to the Bay Bridge, of which the remaining approaches are elements.) The terminal building has remained in transportation use since it was constructed. Losses and compromises of integrity have occurred with modernization of elements such as doors, the new Greyhound passenger facility, and building materials; and seismic retrofit of various components to meet current earthquake safety standards.[7] The terminal requires substantial additional reconstruction to meet building and seismic codes and standards.

Transbay Terminal Loop Ramp

The Transbay Terminal Ramp structure consists of a 3,439-foot loop ramp connecting the San Francisco - Oakland Bay Bridge west span with the Transbay Terminal building. The loop ramp constitutes two of the six approach spans that remain from the original Bay Bridge project.[8] It is constructed of riveted steel girders on concrete and steel bents. A concrete slab and box girder bridge on slab wall piers carries the Transbay Terminal Ramp over Harrison Street in San Francisco. This loop ramp was originally designed to carry trolley trains from the bridge to the terminal; the tracks were removed as electrified trains gave way to buses in the late 1950s. The terminal loop ramp currently serves bus traffic exclusively, and is used for midday storage of transit buses. It is considered a contributing element of the San Francisco - Oakland Bay Bridge.

The San Francisco - Oakland Bay Bridge

The San Francisco - Oakland Bay Bridge is an eight and one-half mile long series of connecting structures carrying two levels of traffic between San Francisco and Oakland. Structurally, the bridge is distinctive in its use of a variety of bridge-building technologies, including -- on the "east span" -- six concrete girder spans, 10 steel girder spans, 22 through truss spans, and a massive cantilever bridge, 1,400 feet long in the cantilevered and suspended segment, with flanking anchor spans of about 510 feet each; and -- on the "west span" -- two suspended spans, one anchored at Yerba Buena Island and one in San Francisco, each anchored to a massive center pier.

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[7] Caltrans, 1995.

[8] Caltrans, 1983.

The east span's (Oakland side) cantilever channel span length of 1,400 feet remained a world record for more than 20 years. The outstanding engineering features of the bridge include the center pier between the two suspension spans of the west span (San Francisco side), and the tunnel connection between the east and west spans on Yerba Buena Island, which was the first double-decked highway tunnel in the United States.

Notable individuals connected with the project were Charles H. Purcell, Chief Engineer; Charles E. Andrew, Bridge Engineer; Glenn B. Woodruff, Design Engineer; and T. L. Pfleuger, Arthur Brown, Jr., and John J. Donovan, consulting architects. Opened to service in 1936, it was evaluated by Caltrans in 1983 as meeting National Register eligibility criteria A, B, and C at the national level, and was determined eligible for listing in 1985 by consensus of the SHPO and the Federal Highway Administration.

Rincon Point/South Beach Historic Industrial Warehouse District

The Rincon Point/South Beach Historic Warehouse Industrial District was developed beginning in the 1850s and 1860s, when landfill efforts and warehouse construction changed the physical appearance of the "point" and "beach" forever. This district contains the greatest concentration of architectural resources within the project vicinity. The district was identified as appearing eligible for the National Register in 1983, based on research completed by Caltrans historians for the I-280 Transfer Concept Project. That research found that the district appeared eligible under all four National Register criteria. About 60 buildings within the district have been identified as contributing to the district's significance. About eight of these buildings date from before the 1906 earthquake, with several from the mid-1800s.

The Rincon Point/South Beach Historic Warehouse-Industrial District, as well as other resources within the APE, have been designated locally and/or are eligible for or listed on the California Register of Historic Resources.[9] Designations and status other than National Register listing/eligibility are reported in Appendix G. Ratings resulting from survey efforts conducted by the San Francisco Planning Department and the Foundation for San Francisco's Architectural Heritage are similarly reported.

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[9] The California Register of Historic Resources was created in 1992 (AB 2881, Frazee), and Section 5024.1 of the Public Resources Code now states that the California Register shall include "California properties formally determined eligible for, or listed in, the National Register of Historic Resources," State Historical Landmarks No. 770 and higher, as well as other State Historical Landmarks and Points of historical interest reviewed and included by the State Historical Resources Commission, and may include other resources of specified types, "if nominated for listing . . . and determined to be significant by the Commission," and resources listed as significant in historical resource survey under certain conditions.

4.17 HAZARDOUS MATERIALS

The proposed project would involve construction within an urbanized area, where hazardous materials can be a concern due to past land uses and unauthorized releases. Potential hazardous materials sources/sites within the project are described below, along with a summary of data sources consulted.

4.17.1 Introduction, Data Sources

Potential areas of contamination that could affect the CalTrain project were identified by reviewing information from regulatory agency databases, interviewing environmental regulators familiar with the project area, and reviewing results of past investigations in the area.

Review of regulatory agency data bases focused on the following: (a) known or potential hazardous waste sites or landfills; (b) sites currently under investigation for environmental violations; (c) sites that involve the manufacture, generation, use, storage, and/or disposal of hazardous materials or hazardous waste (owner and tenants); (d) sites with underground storage tanks (USTs), and (e) sites with recorded violations of regulations concerning USTs and hazardous materials/ hazardous wastes. Seventeen regulatory agency lists were searched to identify listed facilities within the project area, including lists maintained by the US Environmental Protection Agency, the California Environmental Protection Agency, the California Waste Management Board, the California State Water Resources Board, and the Regional Water Quality Control Board.

Ms. Pamela Hollis, CIH, with the San Francisco Department of Public Health, was consulted to identify known Article 20 (Maher Ordinance) investigation sites within the project area. Article 20 of the San Francisco Public Works Code, adopted in 1986, requires investigation and sampling prior to issuance of a grading or excavation permit affecting 50 cubic yards or more of soils in fill areas that lie bayward of the City's historic (1851 or 1868) high tide lines. Steve Mullinnix, Senior Engineer with the San Francisco Department of Public Works (DPW), was consulted to identify areas of known contamination within the project area. Mr. Mullinnix was the DPW's project engineer on the recent realignment and reconstruction of the South Embarcadero Roadway, which extends from Folsom Street to Fourth Street within the project area. During the course of construction of sewers and utilities, considerable knowledge was gained concerning the presence of hazardous materials along the alignment.

Existing reports for environmental investigations within the project area were also reviewed. Relevant environmental investigation reports identified and reviewed as part of this study are listed in the reference section (Appendix B).

4.17.2 Recorded Hazardous Materials Sites

There are three main sources of potentially hazardous materials within the study area: the fill used to reclaim areas of the Bay along the historic shoreline, past industrial land uses, and past and present underground fuel storage tanks. The project area includes reclaimed bay and tidal areas which lay along the historic shoreline of San Francisco. (See Figure 4.8-1 for the location of fill areas and the historic shoreline.) Materials used to fill these shoreline/tidal areas included debris from the 1906 earthquake and fire, and area soils are known to contain elevated concentrations of lead that routinely exceed state hazardous waste criteria.

Past industrial land uses near the historic shoreline also contributed to potential contamination of area soils, and a coal gasification plant that was historically located near Second and Townsend Streets is known to have discharged coal tar directly to the waters of San Francisco Bay, potentially contributing to hazardous materials in the fill areas. Air emissions from the coal gasification plant also resulted in deposition of residues on surrounding soils; and polynuclear aromatic hydrocarbons (PAHs), which are constituents associated with coal tar, can now be found in the soil at many locations in the area. Also, the South of Market area in general contains one of the highest densities of abandoned USTs in the City.

Records review and correspondence with agencies identified 38 individual hazardous materials sites judged to have potential to affect subsurface conditions in the study area. Table 4.17-1 provides a summary of the sites, and site locations are shown in Figure 4.17-1. The main constituents of concern identified in the study area are coal tar residues, lead, and petroleum hydrocarbons associated with USTs, as discussed below.

Coal Tar Residues

Contamination was encountered at several Article 20 investigation sites within the project area, as shown on Figure 4.17-1. The Oriental Warehouse site located at Delancey and Brannan Streets (Site 15) and a property located at Second and Townsend Streets (Site 17) each have coal tar residues. Site 4, located near the intersection of Beale and Howard Streets, is known to contain quantities of PAHs in the soil. The source of coal tar residues and PAHs in the soils was coal gasification plants that generated coal tar as a by-product around the turn of the century. One coal gasification plant existed near Townsend and Second Streets and another near King and Second Streets. Coal tar was discharged directly into Mission Bay and, in some areas, may have been transported there during filling of the Bay. The areas of the Bay that received the discharges were later filled as reclaimed land. The coal tar deposits from these two plants overlap, and together range in thickness from approximately one to five feet and in depth from five to 10 feet below the ground surface. The deposits thin over short distances along Second Street north of Townsend Street but extend laterally to The Embarcadero, Mission Creek (China Basin), and Third Street.

Table 4.17-1
Known Hazardous Materials Sites Identified within the Study Area

Site No.	Site Name and Location	Agency Database	Nature of Release	Resources Affected	Status	Remedial Actions	EDR No.
1	Federal Reserve Bank, SE Corner of Mission and Main Streets	LUST, CORTESE	Waste Oil	Groundwater	Leak suspected, but not confirmed	No Action Taken	1-8
2	Talco, Inc., 621 - 1st Street	LUST, CORTESE	Diesel	Soil Only	Leak suspected, but not confirmed	No Action Taken	1-14
3	301 Howard Street Assoc., NE Corner of Howard & Beale Streets	CERCLIS, FINDS	Coal Gas	Soil Only	No further action necessary	Not Indicated	1-16
4	300 Howard Street Assoc., 300 to 342 Howard Street	RCRIS, FINDS	Coal Gas	Soil Only	Not Indicated	Not Indicated	1-16
5	San Francisco Gas Light Co., 401 Howard Street	Coal Gas Sites	Coal Gas	Soil Only	Not Indicated	Not Indicated	1-17
6	Caltrans (Transbay Terminal), 150 - 1st Street	LUST, CORTESE	Not Reported	Not Indicated	Leak suspected, but not confirmed	Not Indicated	1-20
7	San Francisco Gas Light Co., 166 Fremont Street, 498 Howard Street	Coal Gas Sites	Coal Gas	Not Indicated	Not Indicated	Not Indicated	1-21
8	US EPA; Test Data 2,3,4,5A, 215 Fremont Street	FINDS, RCRIS	Pesticides, Toxics	Not Indicated	Not Indicated	Not Indicated	1-22
9	Graphic Arts Engraving Co., 35 Natoma Street	RCRIS, FINDS, HWIS	Unknown	Not Indicated	Not Indicated	Not Indicated	1-25
10	Dahl Beck Electric Co., 580 Howard Street	LUST, CORTESE	Gasoline	Soil Only	Leak suspected, but not confirmed	No Action Taken	1-32
11	Unocal #1856 (Former), 401 Harrison Street	LUST	Waste Oil	Undefined	No leak action taken after initial report	Excavate and dispose contaminated soil	1-36
12	Unocal, 390 - 1st Street	LUST, FINDS	Gasoline	Groundwater	Remedial action completed or deemed unnecessary	No Action Taken	1-39
13	Bayside Village, 1st Street/Bryant Street	LUST	Gasoline	Groundwater	Remediation plan developed	Remove floating product from water table	2-2
14	Unknown, 101 Brannan Street	LUST, CORTESE	Misc. Motor Vehicle Fuels	Soil Only	Leak suspected, but not confirmed	No Action Taken	2-4

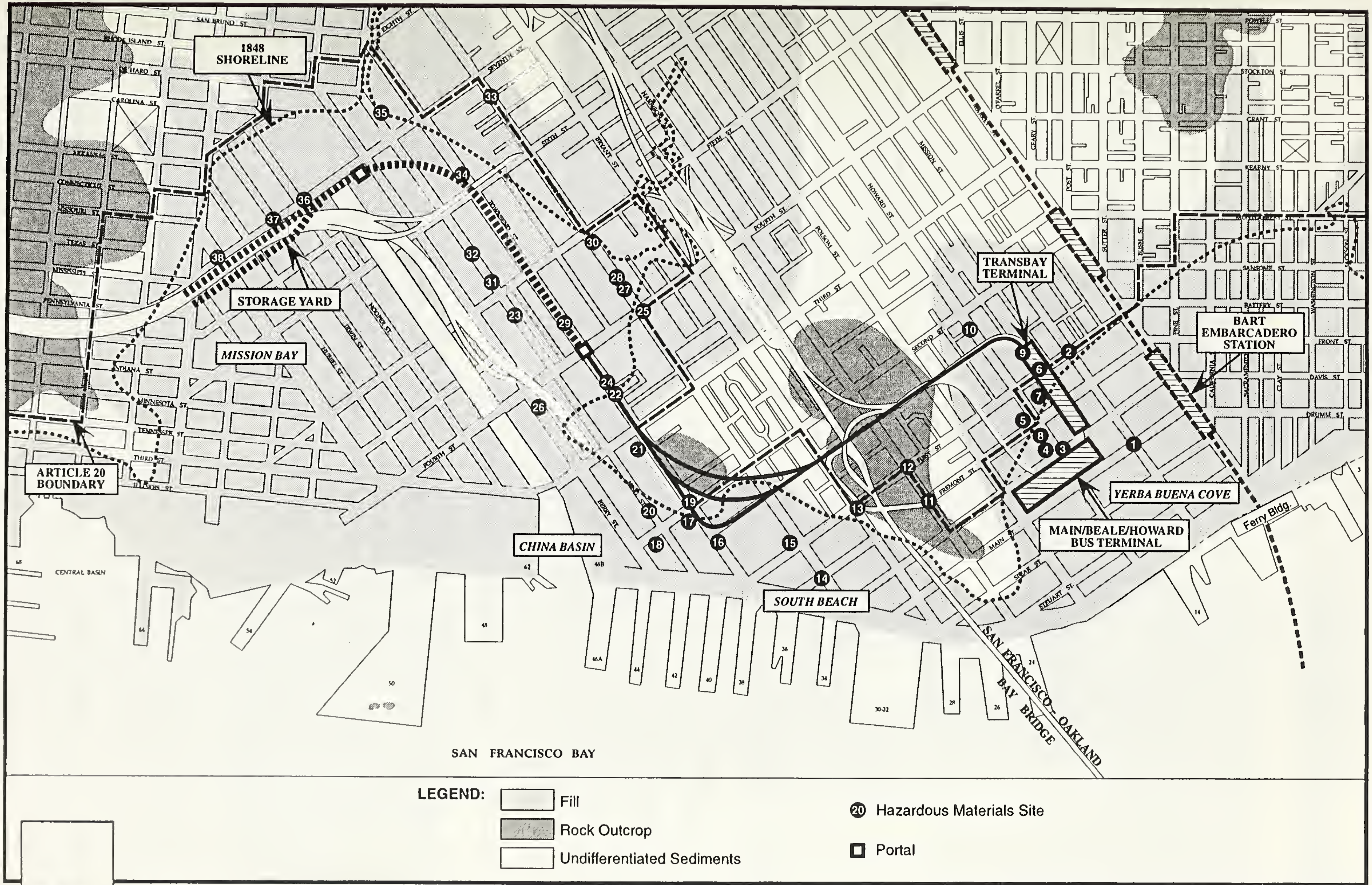
Table 4.17-1
Known Hazardous Materials Sites Identified within the Study Area

Site No.	Site Name and Location	Agency Database	Nature of Release	Resources Affected	Status	Remedial Actions	EDR No.
15	Oriental Warehouse	Not listed	PAHs/LUST	Soil	Not Indicated	Not Indicated	Hollis, 1995
16	San Francisco Redevelopment Agency - Site K, 1-59.5 Townsend Street	LUST	Not Reported	Not Indicated	Remedial action completed or deemed unnecessary	Not Indicated	2-11
17	Unspecified site, Second & Townsend Streets	Not listed	PAHS/LUST	Soil	Not Indicated	Not Indicated	Hollis, 1995
18	PG&E Gas Plant, King and 2nd Streets	CERCLIS, FINDS	Not Indicated	Not Indicated	No further action is necessary; no hazard identified	Not Indicated	2-17
19	San Francisco Fire Dept., 698 - 2nd Street	LUST, CORTESE	Gasoline	Soil Only	Leak suspected, but not confirmed	No Action Taken	2-15
20	San Francisco Gas & Electric Co., 120 King Street	Coal Gas Sites	Coal Gas	Soil Only	Not Indicated	Not Indicated	2-19
21	Pacific Gas Improvement Co., 169 Townsend Street	Coal Gas Sites	Coal Gas	Soil Only	Not Indicated	Not Indicated	2-22
22	Sun Chemical Corporation #1, 252 Townsend Street	Cal-Sites (Cal-EPA)	Not Indicated	Not Indicated	No Further Action	Not Indicated	3-3
23	Unspecified Site	Not listed	Metals	Soil	Not Indicated	Not Indicated	Dames & Morre, 1990a
24	San Francisco Iron Foundry, 260 Townsend Street	Cal-Sites (Cal-EPA)	Not Indicated	Not Indicated	Not Indicated	Not Indicated	3-4
25	Heublin, Inc., 601 - 4th Street	LUST, CORTESE	Not Reported	Not Indicated	Leak suspected, but not confirmed	Not Indicated	3-2
26	China Basin Building, 185 Berry Street	LUST, CORTESE, FINDS	Waste Oil	Groundwater	Leak suspected, but not confirmed	No Action Taken	3-12
27	Serramonte Ford, 530 Brannan Street	LUST, CORTESE	Mineral Spirits	Groundwater	Leak suspected, but not confirmed	No Action Taken	3-5
28	San Pacific Imports, 542 Brannan Street	LUST	Not Reported	Undefined	No leak action taken after initial report	Not Indicated	3-6
29	Southern Pacific Trans, 329 Townsend Street	LUST, CORTESE	Diesel	Soil Only	Preliminary Site Assessment Workplan Submitted	Excavate and dispose contaminated soil	3-10

Table 4.17-1
Known Hazardous Materials Sites Identified within the Study Area

Site No.	Site Name and Location	Agency Database	Nature of Release	Resources Affected	Status	Remedial Actions	EDR No.
30	Fleet Maintenance, 590 Brannan Street	LUST	Not Reported	Not Indicated	Pollution Characterization	Not Indicated	3-9
31	Unspecified Site	Not Listed	Soil	Soil	Not Indicated	Not Indicated	Dames & Moore, 1990a; Mullinix, 1995
32	Unspecified Site	Not Listed	Metals, Petroleum	Soil	Not Indicated	Not Indicated	
33	California Poultry Company, 777 Brannan Street	LUST, CORTESE, HWIS	Gasoline	Groundwater	Leak suspected, but not confirmed	No Action Taken	3-19
34	Flair Electro Sales, 516 Townsend Street	LUST, CORTESE, Notify 65	Diesel	Soil Only	Leak suspected, but not confirmed	No Action Taken	3-22
35	Baker/Hamilton Building, 638 King Street	LUST, CORTESE	Gasoline	Soil Only	Leak suspected, but not confirmed	No Action Taken	3-27
36	Greyhound, Hooper/7th Street	LUST, CORTESE	Kerosene	Soil Only	Leak suspected, but not confirmed	No Action Taken	3-30
37	Chevron, 1200 - 7th Street	LUST	Waste Oil	Soil Only	Remedial action completed or deemed unnecessary	No Action Taken	3-31
38	The Glidden Company, 1400 - 7th Street	LUST	Misc. Motor Vehicle Fuels	Soil Only	Leak suspected, but not confirmed	No Action Taken	3-32

Notes:
1) Site Numbers correspond to site location numbers shown on Figure 4.17-1
2) Information presented in this table is from Environmental Data Resources, Inc. (EDR, 1995 a, b, and c);agency correspondence; and Dames & Moore project files.
3) Number is site number as designated in EDR reports. For example, EDR Number 1-20 indicates that the subject site is site number 20 in Section 1 of EDR's search area (EDR, 1995a).


1848 SHORELINE
STORAGE YARD
MISSION BAY
ARTICLE 20 BOUNDARY
CHINA BASIN
SOUTH BEACH
TRANSBAY TERMINAL
BART EMBARCADERO STATION
YERBA BUENA COVE
MAIN/BEALE/HOWARD BUS TERMINAL
Ferry Bldg.
SAN FRANCISCO - OAKLAND BAY BRIDGE
SAN FRANCISCO BAY
CENTRAL BASIN
SAN BRUNO ST
RHODE ISLAND ST
DE HARO ST
CAROLINA ST
ARKANSAS ST
CONNECTICUT ST
MISSOURI ST
TEXAS ST
MISSISSIPPI ST
PENNSYLVANIA ST
INDIANA ST
MINNESOTA ST
TENNESSEE ST
THIRD ST
ILLINOIS ST
EIGHTH ST
SEVENTH ST
SIXTH ST
FIFTH ST
FOURTH ST
THIRD ST
SECOND ST
FIRST ST
FREMONT ST
MAIN ST
SPEAR ST
STEUART ST
BRYANT ST
HARRISON ST
FOLSOM ST
HOWARD ST
MISSION ST
MARKET ST
TOWNSEND ST
KING ST
BERRY ST
HOOPER ST
IRWIN ST
HUBBELL ST
ELLIS ST
O'FARRELL ST
GEARY ST
POST ST
SUTTER ST
BUSH ST
PINE ST
CALIFORNIA ST
SACRAMENTO ST
CLAY ST
WASHINGTON ST
JACKSON ST
MONTGOMERY ST
SANSOME ST
BATTERY ST
FRONT ST
DAVIS ST
DRUMM ST
POWELL ST
STOCKTON ST
GRANT ST
KEARNY ST
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14
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30-32
34
36
38
40
42
44
46A
46B
48
50
52
54
62
64
LEGEND:
Fill
Rock Outcrop
Undifferentiated Sediments
20 Hazardous Materials Site
Portal

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

HAZARDOUS MATERIALS SITE LOCATIONS

Figure 4.17-1

A third coal gasification plant existed near Fremont and Howard streets and discharged into Yerba Buena Cove along what are now Howard and Beale Streets. Coal tar is known to exist on top of Bay Mud deposits along Beale Street from approximately Mission to Folsom streets. It has been found as far east as The Embarcadero and is believed to extend as far west as Fremont Street. The thickness of the coal tar deposit ranges from near zero along the fringes of the deposit up to seven to 10 feet in the area of Beale and Howard Streets. The approximate depth to the top of the deposit is 10 to 12 feet at Beale Street, shallowing to the west and deepening to the east, although shallow deposits are also found near The Embarcadero at Howard Street. Coal tar residues are believed to be present in soil throughout the entire area of the former Yerba Buena Cove from First Street to The Embarcadero.

Lead

The historic industrial land uses in the project area and the nature of the fill material placed during land reclamation have resulted in areas where lead concentrations in soils exceed State and/or federal criteria for hazardous waste determination (5 mg/l for soluble lead and 1000 mg/kg for total lead). For example, soils with lead were encountered during The Embarcadero roadway and Muni turnaround projects as well as at recent commercial and residential developments in the South of Market Area.

Underground Storage Tanks

Regulatory agency databases included 24 UST (fuel tanks) release sites within the project area, as shown in Figure 4.17-1 and listed in Table 4.17-1. Other, unidentified USTs which may require removal and/or remediation in accordance with City and State requirements likely exist within the study area. Petroleum hydrocarbons are the materials/contamination most frequently associated with USTs.

4.18 VISUAL OR AESTHETIC SETTING

The visual or aesthetic environment in the study area is described below to establish the baseline against which to compare changes resulting from construction of project facilities and the demolition or alteration of existing structures or streetscape elements. This discussion focuses on the vicinity of the existing Transbay Terminal, the proposed Main/Beale bus terminal, and associated properties where the project has the potential to change above-ground structures, affecting the visual appearance of the area and views enjoyed by area users. Areas where the project may install electrification facilities or tunnel portals are also described, along with policies of the San Francisco General Plan.

4.18.1 Transbay Terminal Area

The greater Transbay Terminal area, located between Second, Mission, and Main streets, and the elevated I-80 freeway, contains a mix of residential, commercial, and industrial land uses, and a variety of large residential buildings, warehouses, and office structures in addition to the Transbay Terminal itself, and the elevated bus ramps which currently provide access from the freeway to the terminal and to local streets in the area. The visual environment is diverse, and is determined to some extent by topography. The southern part of the area is bounded by Rincon Hill, where residential uses now coexist with approaches to the Bay Bridge, and wide, long-range views are currently available to the north and east. In flatter areas to the north of Rincon Hill, east-west streets, particularly Folsom and Howard, provide view corridors towards the Bay. Surface parking lots along Folsom Street permit some mid-range views, and high-rise office structures along Market and Mission Streets dominate the northern perimeter of the area. Rincon Hill, east-west streets, and north-south streets in the vicinity are described further below.

Rincon Hill

The elevation of Rincon Hill provided a suitable western terminus for the Bay Bridge; consequently, it is surrounded by approach and exit ramps. The Fremont off-ramp and Transbay Terminal bus ramp curve around the western edge of the hill, and then proceed east, between Folsom and Mission streets. The Rincon Hill area includes residential uses, and residents of buildings on Guy Place at the top of Rincon Hill currently enjoy panoramic views of downtown San Francisco to the north. Residents of other buildings in the area, including those under and south of the Bay Bridge, enjoy views east towards the Bay. The Bay Bridge, I-80 Freeway, Fremont Street off-ramp, and Transbay Terminal ramps are all noticeable visual elements of long-range views from the hill, although from many vantage points, they are obscured by buildings in the foreground.

Mission, Howard, and Folsom Streets

The principal east-west running streets in the vicinity of the Transbay Terminal provide view corridors towards the Bay and Twin Peaks, and are lined with the buildings and structures which define the visual character of the area. Mission Street is a busy commercial thoroughfare, lined with tall office buildings, smaller commercial structures, and institutional uses. The existing Transbay Terminal is a dominant visual element, and is architecturally simple with block forms connected by long rectangles spanning over both Fremont and First Streets on arched steel girders. The main portion of the building is set back on the north side of Mission Street, between First and Fremont Streets; its facade is of cream-colored reinforced concrete, accentuated by tall windows and vertical elements. There is one bus drop-off area directly off Mission Street, and another one at a higher elevation (i.e., "the hump") immediately in front of the Terminal. Other structures along the Mission Street corridor include the office towers at Mission and First Streets, and at Mission and Beale Streets, and include older mid-rise commercial buildings of brick and masonry.

Howard and Folsom Streets also provide view corridors towards the Bay and Twin Peaks, although the existing ramps to the freeway and the Transbay Terminal block the views at certain points. Development along Howard and Folsom Streets is less consistent than along Mission Street, and tall office buildings are infrequent, with smaller commercial buildings and parking lots predominating.

The existing elevated bus ramps which connect the Bay Bridge to the Transbay Terminal form an oval in plan, and cross numerous streets including Howard, First, Fremont, Beale, Tehama, Natoma, and Clementina. At each elevated crossing, the ramp structure is a prominent visual element, and obscures longer-range views. For example, at the intersection of Howard and Beale Streets looking east, the view of the Bay in the distance is almost completely obscured by the steel and concrete ramp structure in the foreground.

First, Fremont, Beale, and Main Streets

The principal north-south running streets in the vicinity of the Transbay Terminal provide short range views towards Market Street and Rincon Hill, and are lined with a mixture of buildings, structures, and parking lots. The existing Transbay Terminal building spans First and Fremont Streets, obstructing views along those corridors.

4.18.2 Tunnel Portal Areas

The area around the existing CalTrain terminal at Fourth Street, between Townsend and King Streets, includes a wide array of visual elements including the terminal, train yards, parking lots, a recreational vehicle parking area, and a variety of small commercial and industrial structures. Long-range views are generally available in many directions due to the amount of open land uses, the small scale of most buildings, and to the recent removal of freeway structures in the area. I-280 ramps are under construction in the area, and King Street is being reconstructed between Third and Sixth streets, and is planned as a tree-lined boulevard with light rail in the median. Townsend Street has tree plantings fronting the rail yard and the existing CalTrain Terminal.

Seventh Street near Berry Street is industrial in character and dominated by the elevated I-280 freeway and existing train tracks.

4.18.3 Storage Yard and Electrification Areas

Existing transportation facilities, including railroad tracks, ancillary structures, area freeways and roadways, are the dominant visual elements at potential storage yard sites and along the existing CalTrain corridor. Towards the north end of the current route, adjacent uses are industrial in character, there is little natural landscaping, and there are no views or vistas of interest. Farther south on the Peninsula, there is a greater variety of adjacent land uses and natural landscaping; however, rail facilities continue to dominate the visual environment of the corridor.

4.18.4 City Plans

Five elements of the *San Francisco General Plan* contain visual or aesthetic policies and objectives regarding the greater Transbay Terminal area. These elements include *the Urban Design Element, the Transportation Element, the Downtown Plan, the South of Market Plan, and the Rincon Hill Plan.* Several urban design policies and objectives that may be relevant to the current project are listed below.

Urban Design Element, Objective 1:

- Policy 1: Recognize and protect major views in the City, with particular attention to those of open space and water.
- Policy 8: Increase the visibility of major destination areas and other points for orientation.

Transportation Element,

- Policy 2.3: Design and locate facilities to preserve the historic city fabric and natural landscape, and to protect views.

Downtown Plan,

- Objective 13: Create an urban form for downtown that enhances San Francisco's stature as one of the world's most visually attractive cities.
- Policy 1: Relate the height of buildings to important attributes of the city pattern and to the height and character of existing and proposed development.

Downtown Plan, Objective 16,

- Policy 1: Conserve the traditional street-to-building relationship that characterizes downtown San Francisco.

South of Market Plan, Objective 7,

- Policy 4: Establish height and building intensity limits for new development which would preserve the existing scale and strengthen the physical form of areas appropriate for new development, enhance the character of adjacent landmark buildings, maintain sun exposure to open space resources, and preserve view corridors.

Rincon Hill Plan,

- Objective 8: To capitalize on the unique qualities of Rincon Hill, specifically its sweeping views of the bay, its proximity to downtown, and its relationship to the waterfront and bay.

- Objective 10: To respect the natural topography of the hill and follow the polices already established in the urban design element which restrict height near the water and allow increased height on the top of hills.
- Objective 11: To maintain view corridors through the area by means of height and bulk controls which insure carefully spaces slender towers rather than bulky, massive buildings.
- Objective 12: To reduce the present industrial scale of the streets by creating a circulation network through the interior blocks, creating a street scale comparable to those in existing residential areas elsewhere in the City.
- Objective 13: To reduce the widths of Main, Spear, and Beale Streets to create additional developable area as well as new pedestrian space.
- Objective 14: To keep wind speeds at a comfortable level.
- Objective 15: To encourage a human scale streetscape with activities and design features at pedestrian eye level.

In general, policies and objectives of the San Francisco Master Plan tend to discourage new pedestrian overpasses or other structures over public streets, and to encourage maintenance of existing street walls, maintenance of existing block and street configurations, and preservation and enhancement of public open spaces. Section 295 of the City Planning Code (Proposition K) regulates shadow from new structures which exceed 40 feet in height.

Destination Downtown, a downtown streetscape plan prepared by the San Francisco Planning Department in 1994 with funding from the San Francisco Transportation Authority, provides guidance regarding a Downtown Pedestrian Network first proposed in the *Downtown Plan*. The streetscape plan acknowledges uncertainty about the future of the Transbay Terminal area, yet proposes three objectives: "retaining the area in front of the [Transbay] Terminal or other suitable areas for much needed open space, retaining the area in the Terminal Separator right-of-way for a garden walk pedestrian connection and open space, and promoting transit stop improvements on Fremont Street." Mid-block pedestrian walkways are envisioned between the Transbay Terminal and Yerba Buena Gardens, and between the Transbay Terminal and South Park.

CHAPTER 5: ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

This chapter analyzes the potential impacts of the proposed project and suggests mitigation measures for the impacts identified. Both long-term effects -- those associated with operation of the project or that result from project right-of-way requirements -- and short-term, construction phase impacts are addressed. Discussions are organized by environmental topic area, except that construction phase impacts are discussed together, following the presentation of longer-term effects. In order to avoid repetition, a few environmental issues are addressed primarily in the construction phase impacts section, because their associated effects would derive primarily from construction activities.

NEPA and CEQA incorporate differing provisions affecting identification and mitigation of impacts. CEQA requires identification of impact level of significance in an EIR, whereas NEPA considers level of significance in determining whether or not to prepare an EIS and, once the decision to prepare an EIS is made, reports project impacts without defining level of significance. Similarly, CEQA requires mitigation only for significant adverse impacts, while NEPA allows for mitigation of all of the impacts of a project. This combined NEPA/CEQA document reports all of the impacts of the proposed project, and proposes mitigation wherever practicable to reduce the impacts identified. Chapter 9 provides specific discussion of impact significance and mitigation in accordance with CEQA.

5.1 LAND USE

5.1.1 No-Build Alternative

The existing Transbay Terminal is identified by the San Francisco Planning Department and Redevelopment Agency as a barrier to development in the Mission Street corridor and South of Market area. The terminal building, adjacent loading areas and associated loop ramps connecting to the Bay Bridge and Second Street occupy considerable land area. Much of this space is currently underutilized. The No-Build Alternative would not cause direct impacts on land use, except insofar as this barrier effect continued with no changes to existing land uses and transportation access in the terminal vicinity.

5.1.2 CalTrain Extension to Transbay Terminal Site Alternative

Implementing the CalTrain Extension Alternative could have beneficial impacts on Mission Street corridor and South of Market area land use as a result of land use changes and changes in transit access. Impacts are described in terms of the three extension segments identified in Section 2.3.1.

Townsend Street Segment

Townsend-Center and Townsend-South Side Alignment Options. Both of these Townsend Street alignment options would improve overall transit access in the South of Market and downtown San Francisco areas by providing for a new surface CalTrain station to be built between Fifth and Sixth streets in addition to the new CalTrain terminal at the Transbay Terminal site. The new station would replace the present Fourth and Townsend Street terminal, to serve Mission Bay and the proposed ballpark, while the new CalTrain terminal would improve access to downtown and South of Market employment concentrations.

Townsend-South/Subway Alignment Option. The Townsend-South/Subway Alignment Option would improve access primarily to downtown San Francisco through a new downtown station. However, transit access in the SOMA in the vicinity of the existing CalTrain terminal would diminish since no replacement station at Fourth and Townsend would be provided under this option. Convenient transit access would be lost for people traveling from the Peninsula to attend events and ball games at the proposed new ballpark, and reductions in economic development activity in the vicinity of Fourth and Townsend could occur. A decline in pedestrian and other transportation related activity would affect nearby uses that depend upon such activity. Because the area is emerging as an independent business and residential area and is the subject of major development proposals such as Mission Bay, decline in transit access would affect long-term mobility for workers and residents in these developments.

On the other hand, removing the existing CalTrain Terminal and train staging tracks would open up more areas for development. Implementation of Muni Metro service along King Street to Sixth Street would offset some of the loss in transit accessibility attributable to the CalTrain alignment option by providing enhanced local connections as well as access to regional transit services.

Mined Tunnel Segment

The Mined Tunnel Segment alignment options would minimize adverse impacts to area land uses, since all facilities would be underground. Displacement impacts are reported in Section 5.2.

Folsom to the Transbay Terminal Segment

Cut-and-cover construction along Folsom Street to the Transbay Terminal site would involve at least short-term displacement of businesses, with potential for longer-term land use effects. Given the resultant improvements in rail and intermodal access in combination with removal of the barrier represented by the present Transbay Terminal, the overall impact of these changes is expected to be positive.

The proposed underground CalTrain downtown terminal would substantially increase the number of transit trips to San Francisco and the study area. By itself, improved rail access would not be expected to alter development patterns markedly. However, in combination with supportive land use planning policies and regulations (e.g., zoning, local area plans), increased accessibility in an already congested urban environment would be expected to facilitate local economic development in the form of office, commercial, retail, and residential uses.

Economic development of this type is considered desirable and is consistent with both the Downtown Plan and Rincon Hill Plan that largely pertain to the downtown station area, as well as with the South of Market Plan and San Francisco Redevelopment Agency plans that affect development in areas immediately to the south. These plans envision the area between Mission and Folsom Streets as a transition area between high density office/commercial uses in the central business district to mixed-use commercial/retail/ residential uses in the South of Market.

The Downtown Plan, *Moving Around Downtown*, includes, among other "transit first" policies, those that support building and maintaining "rapid transit lines to all suburban corridors" and making "convenient transfers possible by establishing common or closely located terminals for local and regional transit systems." Transit terminals and transfer centers are identified specifically for the area in which the downtown CalTrain station would be located.

5.1.3 Mitigation Measures

Since the CalTrain Extension Alternative would have an overall beneficial effect on land uses, no mitigation is suggested.

5.2 DISPLACEMENTS AND RELOCATION

5.2.1 No-Build Alternative

No residential or non-residential displacements would occur directly as a result of the No-Build Alternative. Therefore, this section focuses on the potential displacement effects of the Build Alternative.

5.2.2 CalTrain Extension to Transbay Terminal Site Alternative

No residential units would be displaced by this alternative. The proposed project would affect non-residential uses in three ways: 1) fee title acquisitions, 2) permanent easements, and 3) temporary construction easements.

Although the temporary displacements during construction would be considered short-term (thereby relevant to Section 5.21), they are described in this section to provide a single complete summary of relocation impacts. Businesses and individuals potentially affected are those for which property acquisitions and permanent property easements would be required for the Build Alternative options.

Impacts are estimated for each of the three segments of the CalTrain Extension Alternative. Displacement and relocation impacts in the Townsend Segment and Mined Tunnel Segment would vary according to the alignment and radius options. Table 5.2-1 lists the number of fee title acquisitions by segment and option. Table 5.2-2 lists the number of permanent and temporary easements by segment and option.

Federal and state laws require consistent and fair treatment of owners of properties to be taken, including just compensation for their properties. Uniform and equitable treatment of temporarily or permanently displaced businesses is also required by these laws.

Field surveys and public records searches were performed to determine the potentially affected properties, the number and types of businesses occupying these properties, and the general character of surrounding land uses. Businesses were consolidated into the following categories: small or specialty retail, office/business services, restaurant/bar, recreational/entertainment, parking, private transportation services, vacant structure, and vacant lot.

The estimated number of employees who would be displaced was determined from public business records or estimated by applying per-square-foot factors to the building areas of potentially affected properties. Number of employee estimates are in full-time equivalents in all cases.

Because of the varied types of businesses in the SOMA, the high incidence of small specialty firms, and the relatively rapid changes in business activity, it is difficult to estimate accurately the number of businesses and employees that may be affected by acquisitions that would take place three to five years from now. Several properties are currently vacant but under reconstruction for new uses. New businesses are locating within the area, including within potentially displaced properties. The estimated acquisitions and displacements presented in this section are representative of conditions that may exist when the CalTrain Extension would be implemented. Information would be updated during final design and during pre-construction surveys.

Table 5.2-1
Estimated Non-Residential Acquisitions and Business Displacements for CalTrain Extension Alternative

Alignment Segment/ Options	No. of Properties Affected	Total Est. Land Area in Sq. Ft.	Total Est. Building Sq. Ft.	Estimated Number of Businesses Displaced by Type								Estimated Employees Displaced
				Small Retail	Office/Bus. Services	Rest./ Bar	Recreation/ Entertainment	Parking	Trans. Services	Vacant Structure	Total	
Townsend Street												
Townsend Center	0	0	0	0	0	0	0	0	0	0	0	0
Townsend South Side	0	0	0	0	0	0	0	0	0	0	0	0
Townsend South Subway	0	0	0	0	2	0	0	0	0	0	0	0
Mined Tunnel												
Short-Radius/Long Tunnel	1	37,800	17,350	0	0	0	1	1	0	0	2	25
Medium-Radius/ Medium Tunnel	1	37,800	17,350	0	0	0	1	●	0	0	2	25
Long-Radius/Short Tunnel	0	0	0	0	0	0	0	0	0	0	0	0
Folsom to Transbay Terminal												
Folsom St. to Terminal	●	97,830	114,800	0	19	2	1	0	0	2	24	215
Transbay Terminal Site [1]	1	160,000	495,000	●	2	0	0	●	0	0	14	65
Subtotal for Segment	8	412,030	609,800	2	21	6	1	2	4	2	38	280

Notes: [1] Existing private tenants of the Transbay Transit Terminal.

Source: Sedway Kotin Mouchly Group, De Leuw, Cather & Co., 1996

Table 5.2-2
Estimated Permanent and Temporary Easements for CalTrain Extension Alternative

Alignment Segment/ Options	Permanent Easements [1]				Temporary Construction Easements [2]			
	No. of Properties Affected	Total Est. Land Area in Sq. Ft.	Total Est. Building Sq. Ft.	Number of Businesses Affected	No. of Properties Affected	Total Est. Land Area in Sq. Ft.	Total Est. Building Sq. Ft.	Number of Businesses Affected
Townsend Street								
Townsend Center	2	N / A	0	0	1	43,560	0	0
Townsend South Side	1	N / A	0	0	1	43,560	0	0
Townsend South Subway	1	N / A	0	0	1	43,560	0	0
Mined Tunnel								
Short-Radius/Long Tunnel	2	101,800	171,800	21	1	43,560	0	0
Medium-Radius/ Medium Tunnel	13	198,900	330,700	32	1	43,560	0	0
Long-Radius/Short Tunnel	21	324,300	706,900	45	1	43,560	0	0
Folsom to Transbay Terminal								
Folsom St. to Terminal [1]	0	0	0	0	8	140,000	0	8

Notes: [1] Including seven private businesses operating surface parking lots (open to the public for a fee) on publicly owned rights-of-way (Caltrans).

Source: Sedway Kotin Mouchly Group, De Leuw, Cather & Co., 1996

Townsend Street Segment

No properties or structures would be acquired and no businesses permanently displaced in the Townsend Street Segment of the CalTrain Extension Alternative.

Permanent easements would be required within the Catellus Mission Bay property in the area along Seventh Street to Townsend Street. For the Townsend-Center and Townsend-South Side options, surface easements are necessary. For the Townsend-South/Subway Option, both surface and underground easements would be necessary.

CalTrain has existing easements for surface operation within the area. A permanent surface easement on Catellus' property and in the median of Townsend Street between Seventh Street and the subway portal at Fourth Street and a permanent underground easement east of Fourth Street would be required for the Townsend-Center Option. East of Fourth Street, this option is entirely within public right-of-way.

A permanent surface easement through Catellus' property to Fourth Street, and a permanent underground easement from the City of San Francisco for subway operation under Townsend Street would be required for the Townsend-South Option. For the Townsend-South/Subway Option, permanent underground easements through Catellus' property and under Townsend Street would be necessary. CalTrain has existing easements through Catellus' property between Seventh and Fourth Streets.

Mined Tunnel Segment

No properties or structures would be acquired and no businesses permanently displaced for the Long-Radius/Short Mined Tunnel Option.

One non-residential acquisition would be required, with the potential displacement of two businesses, for implementation of the Short-Radius/Long Mined Tunnel and the Medium-Radius/ Medium Mined Tunnel options. On the order of 25 full-time equivalent employees would be displaced with the disruption and/or loss of these two businesses. A portion of the property would be used permanently for a surface vent shaft with fan room from the subway. All of the site would be used temporarily as a construction staging area for these two mined tunnel options.

All three alignment options would include a temporary construction surface easement for staging of subway construction activity west of the portal in the vicinity of Townsend Street at Fourth Street. The area is currently Catellus property and either vacant or dedicated to CalTrain uses.

Permanent underground easements would be required through approximately eight properties for implementation of the Short-Radius/Long Mined Tunnel Option, with 13 underground property easements for the Medium-Radius/ Medium Tunnel Option, and 21 properties for the Long-Radius/ Short Mined Tunnel Option.

Potential impacts on business uses at the surface include the temporary displacement of employees and residents on the ground and basement levels of structures on these sites while tunnel construction for the CalTrain Extension Alternative is proceeding. This is necessary for underpinning of structures above the subway prior to actual tunneling (see Section 5.20.3). Table 5.2-2 includes an estimate of the total number of businesses on the ground and basement levels of structures on potential easement properties. Based upon preliminary field surveys, no residential use appears to be potentially affected. It is currently estimated that temporary vacation of the ground and basement floors could occur for one-half of the structures over the tunnel and last for two months up to a year. Temporary displacements would be eligible for similar relocation assistance as provided to those experiencing long-term acquisitions and displacements.

The Long-Radius/Short Mined Tunnel Alignment Option would have the largest number of permanent easements and greatest potential for temporary displacement of businesses of the three mined tunnel options. The Short-Radius/Long Mined Tunnel Alignment Option would have the fewest permanent easements and the lowest potential impacts on surface businesses.

Folsom to the Transbay Terminal

This segment of the CalTrain Extension Alternative would have the largest number of potential non-residential acquisitions and long-term business displacements. Seven privately-owned parcels would need to be acquired, displacing approximately 24 businesses with an estimated 215 full-time-equivalent employees. The businesses are primarily office/professional and business services establishments.

The Transbay Terminal would be demolished, resulting in the potential displacement of 14 businesses with 65 employees. The businesses in the terminal include private transportation companies, restaurants/bars, personal services and specialty small establishments. Should a replacement bus terminal be reconstructed on the existing site above the underground CalTrain terminal or as a comparable multi-level structure on a new site in the area, suitable space to accommodate the relocation or replacement of most of the existing private uses within the Transbay Terminal would be provided so that no permanent displacement of businesses and employees would result. However, should the new bus terminal not be replaced at the same site or in a comparable structure nearby, permanent displacement of existing businesses and employees could occur. See Chapter 6 for discussion of replacement mitigation options for demolition of the Transbay Terminal.

Eight construction easements would be required during the construction of the underground CalTrain Terminal and possibly during the construction of the selected replacement option. These easements would involve the temporary displacement of up to seven privately-operated surface parking businesses located on public land (Caltrans right-of-way) with short-term renewable lease agreements with the State (maximum of three-year term). Figure 5.2-1 shows the locations of the parking lots near the proposed project.

Based on a review of current market conditions, most businesses should be able to relocate within the study area. The area is part of the SOMA office submarket, which has approximately five million square feet of space. Absorption and occupancy rates have been on the rise steadily in SOMA over the past decade, as the overall vacancy rate has decreased dramatically from 20 percent in 1970 to nine percent as of June 1996. However, despite the decline in vacancies, SOMA's developed space remains underutilized, with almost 500,000 square feet of office space available.

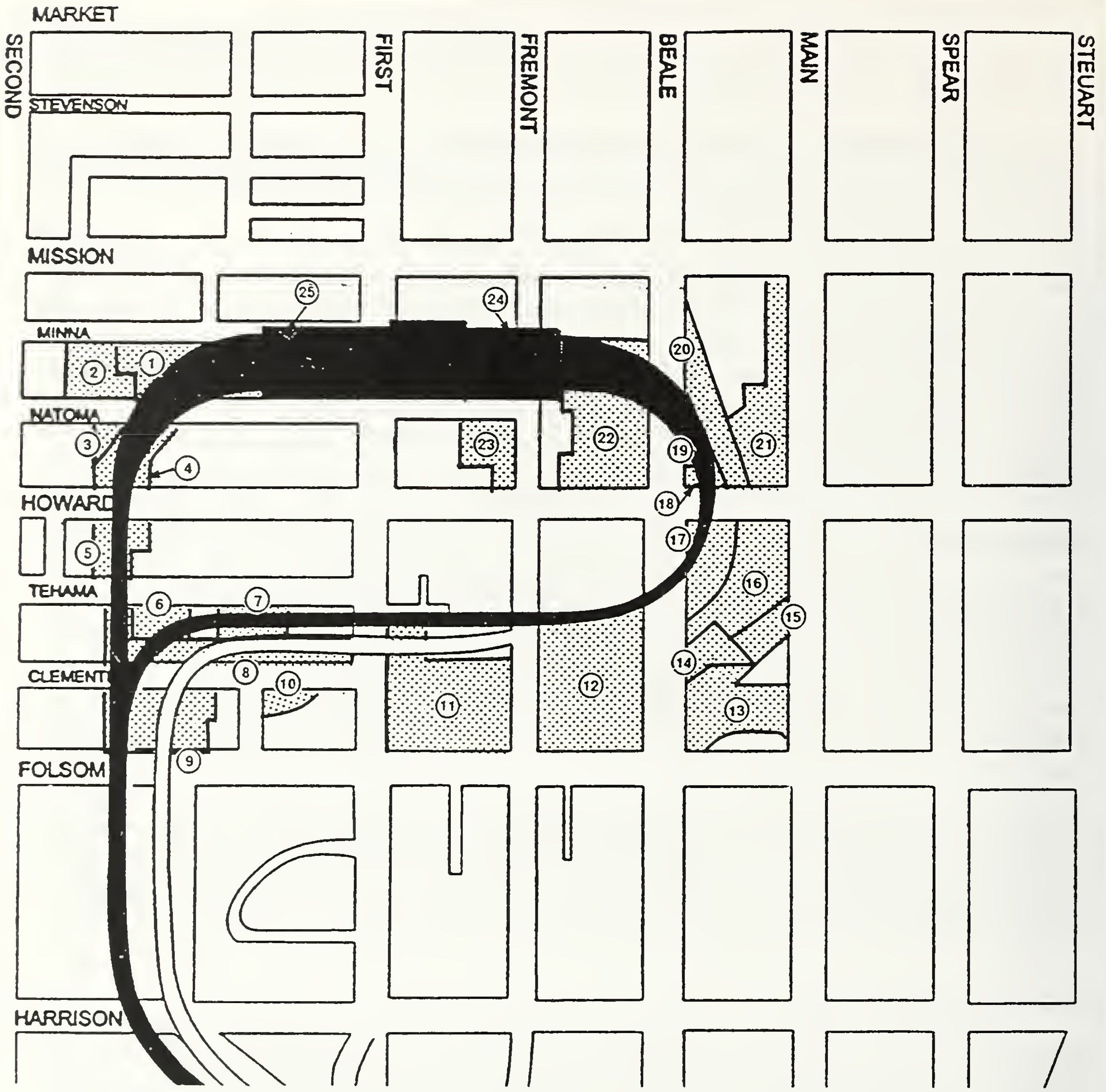
Acquisition of private properties required for the CalTrain Extension Alternative would represent a loss of approximately 132,000 square feet of space, of which 54,000 square feet is estimated to be office space, and 73,000 square feet is estimated to be retail/commercial use. With a sizable inventory of unoccupied office space in the area, displaced businesses interested in relocating within SOMA would likely find an adequate supply of comparable office space available. The restaurants and entertainment establishments potentially displaced should also have little difficulty finding space to relocate within SOMA, especially given the trend of converting warehouse and industrial space for such uses.

Although the extent to which businesses may be affected by mining activities remains uncertain at this time, it is likely that only ground floor businesses would be briefly displaced. These businesses should also be able to find comparable space available in SOMA in which to temporarily or permanently relocate.

5.2.3 Mitigation Measures

The federal Uniform Relocation Act (Public Law 91-646) and the California Relocation Act (Chapter 16, Section 7260 et seq. of the Government Code) and related laws and regulations contain specific requirements that govern both land acquisition and relocation. All real property to be acquired would be appraised to determine its fair market value before an offer is made to each property owner. Minimum relocation payments are detailed in the laws, and include moving and search payments for businesses. For purposes of the relocation acts, parking lots are considered businesses.

The JPB would provide information, assistance and payments to all displaced businesses in accordance with these laws and regulations.


MARKET
SECOND
STEVENSON
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
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①	EUROPARK at Minna St.
②	AMPCO System Parking at Minna St
③	Private for CDS/BPS, Inc.
④	EUROPARK at Natoma St.
⑤	PACIFIC PARK
⑥	Private
⑦	Private/Monthly
⑧	SAFE PARK at Tehama St.
⑨	SAFE PARK at Clementina St.
⑩	CIC PARKING
⑪	GDA PARK
⑫	PARK BAY
⑬	SUN PARK at Beale St.
⑭	PARKING SPOT
⑮	Private for SPTCo.
⑯	SAFE PARK at Howard St.
⑰	SUN PARK at Howard St.
⑱	Private for 301 Howard St.
⑲	SAFE PARK at Beale St.
⑳	Park & Lock at Howard St.
㉑	AMPCO System Parking at Main St.
㉒	CITY PARK
㉓	AMPCO System Parking at Howard St.
㉔	EUROPARK at Transbay Terminal East
㉕	EUROPARK at Transbay Terminal West

Source: DeLeuw, Cather & Co. (Map base by San Francisco City Planning Dept.)

**CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT**

**PENINSULA CORRIDOR
JOINT POWERS BOARD**

**PARKING LOTS
IN THE AREA OF
BUILD ALTERNATIVE**

Figure 5.2-1

5.3 SOCIOECONOMICS

5.3.1 No-Build Alternative

The No-Build Alternative would not directly affect residential or business access or the character of neighborhoods so as to adversely influence location choices or the local economy.

5.3.2 CalTrain Extension to Transbay Terminal Site Alternative

The CalTrain Extension Alternative would result in no long-term displacement, disruption or other adverse impacts on existing residential uses in the study area. In developed areas, the extension would be located either underground, within existing public right-of-way, or in private property currently vacant or dedicated to the same or similar transportation uses.

Impacts on Area Businesses

The CalTrain extension would provide improved access to the major employment center in the heart of downtown San Francisco, and therefore would enhance economic activity in this area.

The CalTrain Extension Alternative would displace businesses in the immediate extension area, with the total number varying from 24 to 40 depending upon tunnel alignment and replacement option for the displaced Transbay Terminal (as discussed in Chapter 6).[1] Each property would be acquired by the Joint Powers Board and each business owner offered relocation assistance. In the event the displaced businesses chose not to relocate within the area, a loss of jobs would result. The maximum number of jobs lost if no businesses relocated in the area would be on the order of 300 jobs. In all likelihood, a number of the affected businesses would relocate nearby or elsewhere within the City and County of San Francisco; other businesses may relocate or expand in the area, in part because of the general improvement in transportation facilities. As a result, net job loss attributable to the project would be minimal. Fiscal impacts of these business displacements are discussed in Section 5.6.

Townsend Street Segment

Each of the three Townsend Street alignment options poses different potential long-term impacts on local businesses. The Townsend-Center Alignment Option, in which the CalTrain alignment and new surface station would be located in the median of a widened Townsend Street, would permanently restrict large truck access to approximately 20 loading docks located between Fifth and Seventh Streets. The inability of large trucks to load and unload at these warehouse and storage facilities may affect business viability and raises the issue of whether or not these businesses would be able to sustain successful operations at their current locations. This option would, however, include a new surface Mission Bay CalTrain Station, which would continue to provide CalTrain access to this area.

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[1] Displacements would vary because of variations in bus ramps by replacement option.

Under the Townsend-South Side Alignment Option, the new rail line would be constructed on the south side of Townsend Street on Catellus property, reducing the long-term impacts to businesses on the north side of Townsend. Access from the north to any new development on the Catellus property would be restricted under this option.

The Townsend-South/Subway Alignment option would have no long-term impacts on the businesses along Townsend Street, but would not allow for a surface station in the Mission Bay area.

Other than the temporary and permanent displacements previously reported, long-term business impacts are not anticipated for the Mined Tunnel segment. The remaining businesses along the Folsom Street to the Transbay Terminal Segment would benefit from the improved accessibility afforded their employees and patrons by the CalTrain Extension Alternative.

5.3.3 Mitigation Measures

Displacement impacts would be mitigated in accordance with the relocation assistance programs summarized in Section 5.2.2, above. Since no other long-term impacts to residential populations, neighborhoods, or land use patterns in the study area are anticipated, no further mitigation is suggested.

5.4 COMMUNITY FACILITIES AND SERVICES

5.4.1 No-Build Alternative

The No-Build Alternative would have no effect on community facilities and services, which are projected to include existing facilities, plus a new baseball stadium at China Basin.

5.4.2 CalTrain Extension Alternative

None of the public and community facilities described in Section 4.3 would be displaced, relocated, or otherwise affected by the CalTrain Extension Alternative.

Transit access from the Peninsula to community facilities north of Market Street, in the vicinity of the existing Transbay Terminal, and facilities along the San Francisco waterfront north of Townsend Street would be improved by the extension of CalTrain, since riders would no longer have to walk or transfer to other modes of transit in order to get to their destination. Access from the Peninsula to the South Beach park and marina at Pier 40 and to the proposed Giants baseball stadium at China Basin would be affected, since CalTrain riders who would be able to walk from the current terminal at Fourth and Townsend under the No-Build Alternative would have to walk somewhat farther under all the Build options: either one block farther from the surface station proposed at Fifth and Townsend Streets in the Townsend Street-Center and -South Side Options, or about one-quarter mile farther from the new terminal at First/Fremont and Mission Streets under the Townsend-Street South/Subway Option.

There would be no community facilities and services impacts for the Mined Tunnel or Folsom to Transbay Terminal Segments.

Traffic patterns would change slightly in the vicinity of the proposed terminal (See Section 5.19), although not to the extent that access to or from any community facilities in the area would be affected. No adverse impacts on emergency response times are expected as a result.

As described in Section 5.17, Safety and Security, police and protection services in the project area would remain the responsibility of various entities: the San Francisco Police Department, the County Sheriff, the California Highway Patrol, and the security forces associated with transit agencies. No reductions or expansions of emergency services are anticipated as a result of the project, except that the responsibilities of security forces and emergency personnel would be extended to include the new railroad tracks, subway, and terminal.

Since no long-term impacts on community facilities and services are anticipated, no mitigation measures are proposed.

5.5 PARKLANDS, SCHOOLS, AND CHURCHES

The No-Build Alternative would have no effect on parks, schools, or churches. With the exception of the plaza immediately in front of the existing Transbay Terminal, none of the parks, recreational facilities, universities, or churches described in Section 4.4 would be displaced or affected as part of any of the CalTrain Extension Alternative Segments, except to the extent that transit access and traffic patterns would change.

The plaza located in front of the existing Transbay Terminal would be displaced by construction of the proposed CalTrain underground rail terminal, although following construction the plaza could be replaced or relocated, along with the bus terminal itself, consistent with the mitigation options described in Chapter 6. The existing plaza is almost entirely paved, and would not be considered a "park" in most senses of the word, although the 1994 Draft *Downtown Streetscape Plan* developed by the San Francisco Planning Department calls for "retaining the area in front of the Terminal or other suitable areas for much needed open space," and “retaining . . . a garden walk pedestrian connection and open space," on the former freeway parcels south of the Terminal.

Accessibility to Golden Gate University's main campus at Mission and Ecker Streets would be enhanced for Peninsula residents.

No long-term impacts on parklands, schools, and churches are anticipated, and no mitigation measures are therefore proposed.

5.6 FISCAL AND ECONOMIC IMPACTS

5.6.1 No-Build Alternative

The No-Build Alternative is the reference point for estimating the fiscal and economic impacts of the CalTrain Extension Alternative and therefore, by definition, would have no impacts.

5.6.2 CalTrain Extension to the Transbay Terminal Site Alternative

The development of the CalTrain Extension Alternative to the Transbay Terminal Site would generate impacts on the City and County of San Francisco's economy. The Build Alternative encompasses several alignment, construction technique, and terminal design options, each of which are addressed in this analysis with respect to their potential economic impacts. Impacts are reported by sub-category for the proposed extension as a whole.

The CalTrain Extension Alternative's potential impacts on the City and County of San Francisco's economy would be due to a number of factors, including construction-related employment from the project, sales taxes on construction materials and equipment, disruptions experienced by businesses during construction of the project, and the loss of parking. Additionally, there would be long-term positive economic benefits as a result of the CalTrain extension.

Potential Fiscal Benefits

A one-time sales and use tax would be collected by the City and County of San Francisco during project construction. According to the State Board of Equalization, the job site is considered as a place of business of a construction contractor or subcontractor, and the "fixtures" that are furnished and installed on the construction site are subject to sales and use tax. Approximately 30 percent of total estimated project construction costs are attributed to construction materials. If these materials were purchased in San Francisco, the standard 8.5 percent sales tax rate would be applied. If 25 percent of these materials were purchased in San Francisco, based on a project construction cost of approximately $720 million, the tax revenue accruing to the City and County would approximate $4.6 million. Materials purchased outside the City and County, but brought into San Francisco to the construction site, could be subject to additional use taxes. This would be in addition to the San Francisco sales taxes.

New employment generated by the construction of the CalTrain Downtown Extension Project would create additional payroll expense tax revenues for the City and County of San Francisco. San Francisco-based contractors and subcontractors that hire additional workers for this project would increase their payroll expenses, therefore generating additional payroll expense tax revenues. Furthermore, the influx of new workers to San Francisco during project construction would generate additional local spending. Based on the construction employment estimated in Table 5.6-1 and assuming that 50 percent of the engineering and management costs are in San Francisco and that benefits are 33 percent of total labor costs, the additional labor costs subject to San Francisco payroll taxes over the life of the project would be about $102 million. With a payroll tax of 1.5 percent, the City and County of San Francisco would collect about $1.5 million in additional payroll taxes over the life of the project.

Regional Economic Impacts

Impact of Project Construction. Total project construction costs for the CalTrain Extension Alternative, including bus terminal mitigation, are estimated at $720 million and up, depending upon which of the alignment and terminal replacement options are ultimately selected. Project construction, including mitigation options for replacement of the Transbay Terminal, is expected to be conducted over a six- to seven-year period, with a possible completion date in the year 2006. Economic impacts related to ongoing construction activities during this time period would be employment generation and business disruption. The potential effect of business disruption on sales tax is discussed in the following section.

The construction costs for each of the various alignment and bus mitigation options would have a direct impact on the number of construction-related jobs created by the project. Table 5.6-1 presents costs and the projected number construction-related jobs created by the CalTrain Extension Alternative base case (see Section 2.3.5) and one mitigation option for replacement of the Transbay Terminal (See Chapter 6). Costs in Table 5.6-1 exclude right-of-way, design, contingency, and reserve allowances. With the exception of right-of-way costs, these excluded costs could increase the estimated employment created by the project spending by a factor of two to three. Project cost estimates were converted to direct construction employment estimates by applying the following factors: percent of construction costs attributable to labor; labor costs; and project management and engineering costs.

Table 5.6-1 illustrates that the CalTrain Extension base case is estimated to create approximately 1,700 direct employment opportunities or full-time equivalent jobs over the construction life of the CalTrain project, with an additional estimated 515 jobs for construction of a new bus terminal. When divided by the estimated seven years of construction activities, the annual average direct employment is between 245 jobs for CalTrain and 75 jobs for a new bus terminal. These numbers could increase, depending upon the suboption selected.

Table 5.6-1
Estimated Construction Employment Impacts

	CalTrain Base Case (See Table 2.3-2)	Bus Mitigation Option A (See Chapter 6)
Project Costs ($000)		
Project Construction Costs [1]	$323,600	$98,000
San Francisco-Based Construction Costs [2]	$196,900	$59,600
Engineering and Management Costs	$71,400	$21,600
Project Employment		
Project Costs Attributed to Labor (3)	$81,700	$24,700
Construction Employment (4)	1,100	330
Engineering and Management Employment (5)	600	180
Total Direct Employment	1,700	515
Annual Direct Employment (6)	290	75
Total Indirect and Induced Employment (7)	325	100
Annual Indirect and Induced Employment	45	85
Total Project Employment	2,025	615
Annual Project Employment	290	85

Notes:

[1] ICF Kaiser Engineers, "Preliminary Capital Cost Estimate," Detailed Summary, June 1996. Excludes costs for right-of-way, design, contingency, and reserve allowances.

[2] Based on Total Project Construction Costs provided by ICF Kaiser Engineers. Excludes construction costs for locomotives, which will not be purchased in San Francisco, and Park and Ride lots not located in the City and County. Includes 20 percent of gallery car costs, which will also be purchased outside San Francisco but will require some local assembly.

[3] Assumes 50 percent of San Francisco-Based Construction Costs are attributable to labor. Project Costs Attributed to Labor include benefits, but nets out 17 percent for overhead expenses, based on "Means Building Construction Cost Data," 54th Annual Edition, 1996. Project Costs Attributed to Labor accounts specifically for jobs generated in San Francisco.

[4] Assumes a $310 daily compensation rate, 48-week work year, and five-day work week. The daily compensation rate includes benefits and is an average for all construction trades as reported in "The 1996 International Construction Costs and Reference Data Yearbook."

[5] Assumes a $495 daily compensation rate, 48-week work year, and five-day work week. The daily compensation rate includes benefits and is an average for project/site managers and engineers as reported in "The 1996 International Construction Costs and Reference Data Yearbook."

[6] Annual average employment is derived by dividing total employment by seven years.

[7] Based upon Association of Bay Area Governments' Input-Output Model employment multiplier for highways and public utilities construction of 0.19. Indirect and induced job generation will occur throughout the Bay Area, and will not be limited to the City and County of San Francisco.

Sources: "The 1996 International Construction Costs and Reference Data Yearbook," John G. McConville; "1992 Census of Construction Industries," U.S. Department of Commerce; Means Building Construction Cost Data," Western Edition, Ninth Annual; ICF Kaiser Engineers, and Sedway Kotin Mouchly Group.

Employment opportunities directly generated by project construction would in turn spur indirect employment opportunities. The Association of Bay Area Governments' Input-Output Model indicates that the employment multiplier for highway and public utilities construction is 1.19. This figure can be interpreted to mean that for each direct CalTrain Extension Project construction employment opportunity, an additional 0.19 full-time employment opportunity is estimated to be created within the San Francisco Bay Area region (not limited to the City of San Francisco). In other words, the multiplier effect adds 19 percent more jobs in the region. This multiplier effect would be in effect for the duration of construction of the CalTrain Extension Project.

As a result of this multiplier effect, approximately 320 indirect and induced employment opportunities would be generated over the life of the CalTrain base project, with an additional 100 jobs for a replacement bus terminal, bringing the total number of employment opportunities attributable to the CalTrain Extension Project to an estimated 2,020 and 615 for the bus terminal replacement. Over the estimated seven-year life of construction activities, the average annual total number of employment opportunities for the CalTrain and bus terminal is projected to be around 375.

Long-Term Economic Benefits. Despite the potential adverse impacts on Townsend Street businesses during construction of the CalTrain Extension, long-term economic benefits are expected as well. The Townsend-Center and Townsend-South Side alignment options both include a new surface CalTrain station, through which thousands of commuters would pass daily. Retail and service businesses located around the new station would benefit from the increase in CalTrain ridership, which could ultimately include San Francisco Giants baseball fans attending games at the proposed nearby stadium.

Increased CalTrain ridership implies other future economic benefits, which at this time can be discussed qualitatively. A more centrally located downtown CalTrain station would make downtown San Francisco more accessible to the concentration of employees in the downtown area (see Section 1) making their employment area more economically viable as well as attractive to out-of-town visitors, resulting in additional visits to the City and increased spending.

Potential Fiscal Losses -- Effects on Government Revenues

This subsection reviews the possible loss of tax and other revenues to the City and County of San Francisco associated with land acquisition and conversion of private properties to public use in the downtown extension of CalTrain. See Table 5.6-2 for an estimation of the costs to the City and County of San Francisco by tax source. The estimation approach for each tax is described in turn in the following sections.

Table 5.6-2
Fiscal Costs to the City and County of San Francisco (Worst Case Scenario [1])

Revenue Source	Annual Revenue Loss
Property Tax [2]	($57,000)
Sales and Use Tax [3]	($56,000)
Payroll Expense and Business Tax [4]	($87,000)
Parking Tax [5]	($456,000)
Possessory Use Tax [6]	($92,000)
Fiscal Cost to General Fund	**($748,000)**
Total 1991 Tax Revenues for City and County of San Francisco = $943,000,000	**0.0008 of total revenue**

Notes:

[1] Includes temporary loss from seven parking lots that could be placed in original location following construction. Assumes that no business will relocated to within the City and County of San Francisco, an unlikely assumption.

[2] See Table 5.2-1 for summary of properties affected. Taxes were estimated using a 1.163 property tax rate.

[3] Sales and use tax losses were based on taxable sales estimates provided by the State Board of Equalization and Dun and Bradstreet.

[4] Based upon payroll expense and business tax estimates for businesses summarized in Table 5.2-1. Total number of employees generated based upon 290 s.f. per employee for downtown San Francisco office space, 450 s.f. per employee for restaurants, and 660 s.f. per employee for dance clubs. Annual employee wages estimated by assigning SIC codes for: Business Services, Amusement and Recreation Services, and Eating and Drinking Places. Annual wages for these employment classifications provided by U.S. Department of Commerce, "1992 County Business Patterns." A 1.5 percent payroll tax was then applied to the total payroll expenses. Business taxes for the seven parking lots were estimated at a rate of $3.00 per every $1,000 in annual gross receipts.

[5] Assumes a $6/day flat rate (total of 900 spaces) with 100 percent occupancy five days a week and 75 percent occupancy two days a week, over a 52-week period. A 25 percent parking tax rate was applied to the total gross revenues.

[6] Based upon a 25 percent tax on the rent paid to Caltrans by the parking lot operators and one other lease holder.

Sources: Office of the Controller, City and County of San Francisco; U.S. Department of Commerce, "1992 County Business Patterns;" Building Owners and Managers Association International, "1995 BOMA Experience Exchange Report;" Dun & Bradstreet; State Board of Equalization; "Statistical Abstract of the United States, 1993;" Caltrans; De Leuw, Cather & Company; ICF Kaiser Engineers, and Sedway Kotin Mouchly Group.

Property Tax. Property taxes are levied on the assessed value of all privately-owned property and are collected by the City and County of San Francisco. For Fiscal Year 1994-95 the property tax rate levied was 1.163 percent. Of the collected property tax revenues, approximately 71 percent is allocated to the City/County of San Francisco's General Fund, with the remaining revenues accruing to debt service, special revenue funds, and special districts. According to the preliminary engineering plans developed for this DEIS/DEIR, implementation of the CalTrain

Extension Alternative would entail the acquisition and demolition of eight privately-owned structures, resulting in an estimated annual reduction of $57,000 in property tax revenues.

Sales and Use Tax. Business acquisitions associated with the conversion of private properties for public use due to the extension of CalTrain would lower the City's volume of sales tax revenues. The eight buildings that would be acquired and demolished for public use house 24 active businesses, most of which are small professional service businesses. According to the State Board of Equalization, businesses located in those properties that have been identified as takings generated $4.3 million in taxable sales in Fiscal Year 1994-95. On this total, it is estimated that the City and County of San Francisco would lose $56,000 in sales taxes as a result of business displacement. However, if the displaced businesses choose to relocate elsewhere within the City and County of San Francisco, sales tax losses would be minimized.

Loss of sales tax to the City and County of San Francisco would also be likely to occur on a temporary basis, during various phases of construction of the CalTrain Extension Project. Although it is impossible to quantify accurately the extent to which sales volume might decrease for businesses that would be subject to negative construction impacts (particularly for retail businesses on Townsend Street), temporary drops in sales activity for these businesses would result in additional revenue loss to the City and County of San Francisco. The reasonable range of such losses can be estimated. Using taxable sales information provided by the State Board of Equalization, it is estimated that businesses located on Townsend Street between Third and Seventh streets generated approximately $35 million in taxable sales in Fiscal Year 1994-95, representing $437,500 in sales tax revenues to the City and County of San Francisco's General Fund. If these businesses were to experience a 10 percent decrease in business due to construction activities, this would result in an annual sales tax loss of $43,750.

Payroll Expense Tax and Business Tax. The Payroll Expense Tax and Business Tax are two separate and distinct taxes, with different tax measures, exemption provisions, and apportionment formulas. The Payroll Expense Tax is a tax on the payroll expense of persons and associations doing business in San Francisco. The Business Tax is a gross receipts tax on all business activities performed by any person or association in San Francisco. All businesses registered in the City and County of San Francisco must calculate both taxes, and then pay the higher of the two to the Tax Collector.

The methodology for determining this tax loss to San Francisco, attributable to property takes, was based on generating estimated payroll expenses for those businesses to be displaced. Calculating the business tax is not possible, given the confidentiality of individual businesses' gross receipts. Using the total square footage of office and retail space currently occupied in the buildings to be acquired for public use, an estimated number of employees was generated, based upon industry standards for employees per square foot of office and retail space. Average annual wages for the total number of employees were then derived, based upon the types of businesses located in the buildings and the assignment of Standard Industry Classification wages. Upon estimating the total payroll expense for all businesses housed in these buildings, a tax rate of 1.5 percent was applied, representing the annual payroll expense tax due to the City and County of San Francisco.

The CalTrain Extension Alternative would also result in the temporary loss of seven privately-operated surface parking lots, which are also subject to payroll expense and business tax. However, given the small number of employees needed to operate a parking lot, it is more likely that these businesses pay the business tax based on gross receipts than the payroll expense tax. The methodology employed to determine this potential revenue loss to the City and County of San Francisco was based on estimating annual gross sales for the seven parking lots, and applying the mandated tax rate of $3.00 for every $1,000 in gross receipts.

In Fiscal Year 1994-95, payroll expense and business taxes represented almost 13 percent of City and County revenues. Property acquisitions associated with the CalTrain Extension Project could result in lost payroll expense and business tax revenues, depending on whether or not displaced businesses choose to relocate within the City and County of San Francisco. The 24 businesses and seven parking lots currently located on those properties are estimated to generate approximately $87,000 in payroll expense and business taxes annually. If these businesses do not relocate within City limits, these revenues would represent permanent losses to the City and County of San Francisco.

Parking Tax. The City/County of San Francisco collects a parking tax, at a rate of 25 percent, from all garages and lots operated in San Francisco. There are seven privately operated surface parking lots and parking within the Transbay Terminal accounting for approximately 900 parking spaces, that could be temporarily displaced if the CalTrain Extension Alternative were implemented. With annual gross revenues for these lots estimated at $1.8 million, the City and County of San Francisco would lose approximately $456,000 in annual parking tax revenues.

This analysis takes a worst-case viewpoint, which assumes that the cars that used the displaced parking spaces disappear from San Francisco. The more likely case is that the cars shift to other parking lots within the City and that there is very little, if any, loss of parking tax revenues.

Possessory Interest Tax. Under California law, publicly-owned land is generally exempt from property taxation. However, property on such land that is leased to a taxable entity could be taxable. The taxable entity is said to have a possessory interest in the property, defined in terms of the entity's right to exclusive beneficial use of the property. Based on discussions with Caltrans, there are several businesses located along the CalTrain Extension alignment that are subject to possessory interest taxes. The seven privately operated parking lots, as well as two other businesses, are all subject to this tax, as they lease their property from the State.

According to the San Francisco Assessor's Office, possessory interests are valued for tax purposes on the basis of the economic rent paid to the landowner using standard appraisal methods. In the case of the properties owned by Caltrans along the Essex and Beale Streets rights-of-way, a tax rate of 25 percent is applied to the annual rent paid to the State by the private businesses operating on these properties. As a result of this tax, and the potential displacement of the businesses currently operating on Caltrans properties, the City and County of San Francisco would face an annual loss of approximately $92,000 in possessory interest tax.

Total Tax Loss. From Table 5.6-2, the total potential annual tax loss to the City and County of San Francisco is estimated to be $748,000 per year, of which two-thirds would be from the loss of the parking tax on parking lots that would be vacated during construction.

Because the sales and use taxes, payroll expense and business taxes, and parking taxes will be lost only if the affected business and parked cars actually leave the City, the actual tax loss would be likely to be only a fraction of this total. At a minimum, the property tax and possessory use tax would be lost, totaling $149,000 annually. These potential losses should be contrasted with the total tax revenue for the City and County, which amounted to $943 million in 1991.[2] Thus the possible range of tax loss is estimated to be no more than 0.08 percent of the total tax revenue for San Francisco prior to taking in account any offsetting tax gains, which are discussed in the preceding section.

5.7 AIR QUALITY

This section considers potential long-term impacts and benefits of the proposed project with regard to regional air quality, and also considers the potential for localized exceedences of the state and federal Ambient Air Quality Standards (AAQS) described in Section 4.6. Impacts are assessed by comparing conditions under the No-Build and Build alternatives, and by comparing projected concentrations of pollutants to the AAQS.[3]

5.7.1 Conformity Assessment

In order to demonstrate conformity with the federally approved State Implementation Plan (SIP) and the Clean Air Act amendments, as required by MTC Resolution No. 2270, a project must: (1) come from a transportation plan and program (i.e. a Regional Transportation Plan and Transportation Improvement Plan, or RTP and TIP) that have been found to conform; and (2) eliminate or reduce the severity and number of localized violations of the federal ambient air quality standards in the area substantially affected by the project.

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[2] U.S. Department of Commerce, *Statistical Abstract of the United States*, 1993, p.312.

[3] Comparisons between existing and projected future conditions are of limited interest because vehicle emissions are expected to decrease in the future due to advances in vehicle technology and fuel formulas, and because both emission factors and pollutant concentrations are therefore expected to decline.

The CalTrain Extension to the Transbay Terminal Site Alternative meets the first conformity criterion if (1) it is included in the current RTP and TIP, and (2) the current RTP and TIP have been found to conform to the SIP.

To determine if the CalTrain Extension Alternative meets the second criterion, the cumulative CO concentrations near roadway intersections predicted under the CalTrain Extension Alternative and the No-Build Alternative in the year 2010 analysis are compared with the federal CO ambient air quality standards. If there are no new exceedences under the CalTrain Extension Alternative, then the project satisfies this criterion. This policy position is provided in the preamble to the final EPA conformity rule (58 CFR 62212) (EPA, 1993).

5.7.2 Local and Regional Air Quality

Projects that would increase or decrease the total vehicle miles traveled (VMT) in a neighborhood or region have the potential to increase or decrease the total quantities of motor-related pollutants emitted. To assess changes in the overall quantities of pollutants, the projected future daily VMT in the vicinity of the proposed CalTrain Terminal station and in the Bay Area region were compared under Build and No-Build conditions. In general, the CalTrain Downtown Extension is expected to produce a small decrease in regional auto traffic (reduction in VMT), and a slight increase in VMT in the immediate vicinity of the new terminal.

Proposed Terminal Area. The neighborhood surrounding the proposed CalTrain Terminal would experience similar traffic volumes under the No-Build and Build alternatives, although the projected daily VMT would increase marginally in the Build Alternative due to proposed changes in the street network such as the possible extension of Essex Street between Folsom and Howard, and the potential relocation of the Transbay Terminal bus facility, as described in Chapter 6.[4]

The marginal increase in daily VMT would not be sufficient to cause a measurable change in the projected daily local emissions burden (tons per day) of any of the pollutants analyzed, including reactive organic gas (ROG), carbon monoxide (CO), nitrogen oxide (NOX), sulfur oxide (SOX), and particulate matter (PM10).

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[4] Korve Engineering, CalTrain Downtown Extension Project Traffic Study, May 30, 1996 and Terry A. Hayes Associates, CalTrain Downtown Extension Project Air Quality Technical Report, May 30, 1996.

Bay Area Region. Extension of CalTrain would result in some drivers shifting to transit, and would therefore result in a reduction of daily VMT when compared to the No-Build Alternative. Specifically, the total daily VMT in the region under the Build Alternative would be about 145,000, or about one percent, less than under the No-Build Alternative. This decrease would result in incremental regional reductions in the projected daily local emissions burden (tons per day) of some pollutants.[5]

Locomotive Emissions. Potential regional contributions to criteria pollutants by CalTrain locomotives were analyzed using the South Coast Air Quality Management District's handbook regarding locomotive emissions, which applies emission factors to the number of trains and trip lengths to derive total emissions in pounds per day.[6]

As described in Chapter 2, the No-Build Alternative may include either 60 or 86 trains per day. Under the Build Alternative, there would also be either 60 or 86 trains per day, and three propulsion options are under consideration: dual mode with electric trailer units; dual mode with new locomotives; and full system electrification. Train trips would be slightly (about six minutes) longer under the Build Alternative than under the No-Build Alternative.

In terms of locomotive emissions, both dual mode options would be virtually the same as the No-Build Alternative. This is because both dual mode options propose electric service along the proposed 1.3 mile extension, with continued diesel-powered service along the existing track, similar to service anticipated under No-Build conditions.

As shown in Table 5.7-1, no new exceedences of the BAAQMD's significance criteria would occur under the CalTrain Extension Alternative with Full System Electrification. Some existing exceedences (ROG and NOX) and exceedences projected to occur under the No-Build Alternative (ROG, NOX, and PM10) would remain under the dual-mode propulsion options.

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[5] Korve Engineering, CalTrain Downtown Extension Project Draft EIS/EIR Ridership Forecasting Results Report, May 29, 1996 and Terry A. Hayes Associates, CalTrain Downtown Extension Project Air Quality Technical Report, May 30, 1996.

[6] The South Coast Management District, Final 1994 Air Quality Management Plan Appendix IV-D, Controlling Locomotive Emissions in California, September 1994, Chapter 11.2 -- Electrification Costs, p. 127, *and* CEQA Air Quality Handbook, April 1993, Page A9-114, Table A9-11-B -- Emission Factors for Each Criteria Pollutant from Consumption of Electricity. (While the current project does not fall within the South Coast Management District's area of jurisdiction, these guidelines establish procedures and emission factors appropriate for the analysis of rail projects throughout California.)

Table 5.7-1
Estimated Locomotive Emissions (lbs per day)
Under Existing and Future 2010 Conditions with Two Propulsion Options

	Existing Operations	No-Build Alternative (94 Minutes per Trip)		CalTrain Extension Alternative (100 Minutes per Trip)				
Trains per Day	60 Trains	60 Trains	86 Trains	60 Trains	86 Trains	60 Trains	86 Trains	BAAQMD Thresholds
Propulsion Option	Diesel	Diesel		Both Dual-Mode Propulsion Options		Full System Electrification		
Reactive Organic Gas (ROG)	**112.26**	**112.26**	**159.04**	**112.26**	**159.04**	0.49	0.69	80
Carbon Monoxide	225.56	225.56	319.54	225.56	319.54	9.74	13.80	N / A
Nitrogen Oxides (NOX)	**3,295.77**	**3,295.77**	**4,669.00**	**3,295.77**	**4,669.00**	56.01	79.34	80
Sulfur Oxides (SOX)	189.03	189.03	267.79	189.03	189.03	5.84	8.28	N / A
Particulate Matter (PM10)	70.70	70.70	**100.16**	70.70	**100.16**	1.95	2.76	80

Bold Face = Exceedence of BAAQMD CEQA Significance Criteria (See Table 4.6-2).

Source: Terry A. Hayes Associates; De Leuw, Cather & Company, June 1996

5.7.3 Microscale Air Quality

Future emissions from automobile traffic were projected under the Build and No-Build Alternatives using both the Bay Area Air Quality Management District's (BAAQMD's) Carbon Monoxide Screening Model, and the U.S. Environmental Protection Agency approved CAL3QHC Roadside Carbon Monoxide Model. Similar to CALINE4, another commonly used computer model, both methodologies use existing and future traffic volumes, roadway geometry, meteorological conditions, and CO emission factors to estimate CO emissions at representative intersections. The intersections selected for analysis are all in the vicinity of the proposed CalTrain Terminal, and include the intersections of Fremont and Folsom Streets, First and Howard Streets, Fremont and Mission Streets, and First and Mission Streets. Analysis results using both methodologies are provided in Table 5.7-2, below. As shown, no exceedences of the 1-hour or 8-hour CO standards are anticipated as a result of the project.

Table 5.7-2
Estimated 1-Hour and 8-Hour CO Concentrations at Representative Intersections in Parts Per Million (ppm)

	Federal / State Standards		BAAQMD Screening Model Results[a]						CAL3QHC Roadside CO Model Results					
			Existing		2010 No-Build		2010 Build		Existing		2010 No-Build		2010 Build	
	1Hr	8Hr	1Hr	8Hr	1Hr	8Hr	1Hr	8Hr	1Hr	8Hr	1Hr	8Hr	1Hr	8Hr
Fremont & Folsom Streets	35 / 20	9 / 9	8.5	6.9	4.4	3.6	3.9	3.9	8.5	6.9	4.2	3.5	3.8	3.2
First & Howard Streets	35 / 20	9 / 9	12.7	**9.8**	5.6	4.5	5.6	4.4	12.1	**9.4**	5.3	4.3	5.1	4.2
Fremont & Mission Streets	35 / 20	9 / 9	12.1	**9.4**	5.5	4.4	4.8	3.9	13.5	**10.4**	5.5	4.4	5.4	4.4
First & Mission Streets	35 / 20	9 / 9	12.1	**9.4**	4.3	3.6	4.9	4.0	12.0	**9.3**	5.7	4.6	5.0	4.1

[a] Value may be up to 0.8 ppm less in some cases, depending on mitigation options described in Chapter 6.
Bold Face = projected exceedences of State and/or federal standards.

Source: BAAQMD; Terry A. Hayes Associates; De Leuw, Cather & Company, June 1996.

To provide a level of consistency with other documents prepared by the City of San Francisco, future emissions from automobile traffic were also projected under the Build and No-Build Alternative using the City of San Francisco's Modified Linear Rollback Method.

The Modified Linear Rollback Method was developed by the Planning Department's Office of Environmental Review in consultation with the BAAQMD in order to analyze potential vehicular traffic emissions resulting from land use and development projects in downtown San Francisco. The methodology uses emission factors and traffic volumes to estimate CO emissions, and compares those emissions to existing and projected future emissions at a control intersection (Sixth and Bryant Streets) to determine 1-hour and 8-hour CO concentrations. Results of the modified linear rollback analysis were consistently lower, but similar in terms of overall level of magnitude, with the results presented in Table 5.7-2, and no exceedences of CO standards were projected.

5.7.4 Mitigation Measures

No exceedences of State or federal AAQS are projected under either alternative in the future analysis year of 2010, and no mitigation is therefore required for long-term air quality effects resulting from project operation.

5.8 NOISE AND VIBRATION

This section analyzes potential increases in noise and vibration resulting from the CalTrain Extension Alternative in future analysis year 2010. Potential sources of noise and vibration considered include airborne noise from trains operating along Seventh and Townsend Streets south and west of the subway portal near Fourth Street in the Townsend-Center and -South Side alignment options, ground-borne vibration and noise from subway operations in all three project segments, and traffic noise from any increases in traffic volumes or changes in traffic patterns.

5.8.1 Sensitive Receptors

A visual survey of the project area was conducted to determine the location of residential land uses (including live/work units) that might be affected by changes in noise or vibration. Receptor locations identified are shown in Figure 5.8-1. Residential land uses are generally considered most sensitive to changes in noise and vibration, except where research or manufacturing activities require vibration sensitive instrumentation or where background noise can pose a problem, such as in recording studios. Although multi-media companies are located within the study area, their operations are not uniquely sensitive to outside noise and vibration except where studio recordings are being prepared. Based on a visual survey of the study area, the closest recording studio is approximately 700 feet from the proposed CalTrain Extension alignment, and impact from rail noise or vibration is therefore extremely unlikely.

5.8.2 FTA Criteria for Noise and Vibration

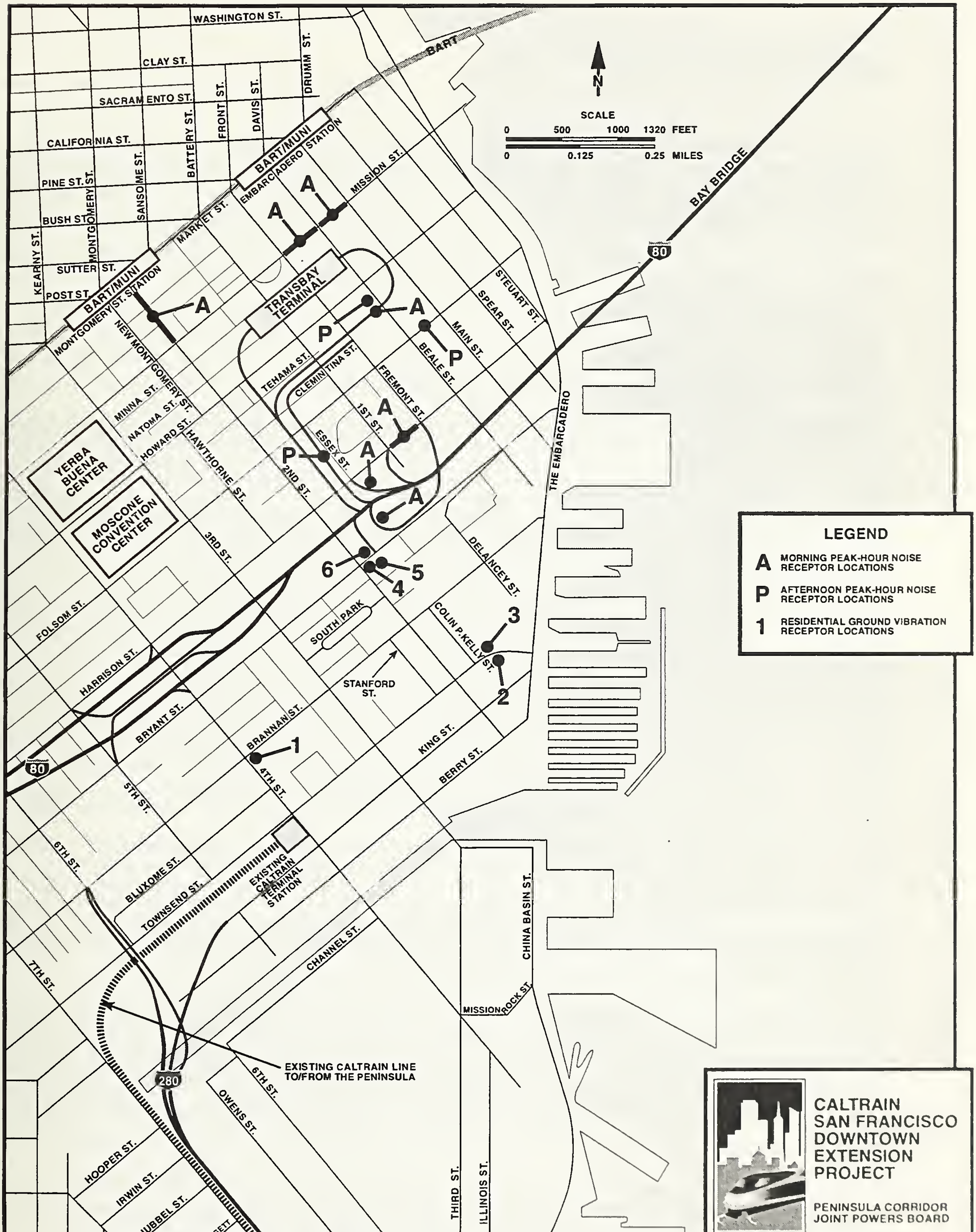
The FTA's Noise Criteria consider the combination of existing noise exposure and project-specific increases in relation to three sensitive land use categories:

Category 1: buildings or parks where quiet is an essential element of their purpose;

Category 2: residences and buildings where people normally sleep; and

Category 3: institutional land uses with primarily daytime and evening use (e.g. schools, libraries, churches).

Under the FTA criteria, as existing (background) noise levels increase in certain sensitive settings, the increment that a project may contribute before an exceedence occurs decreases. For example, if the existing noise exposure in a residential area is 60 dBA, a transit project may contribute an additional 2 dB before the "impact" criterion is exceeded (an additional 5 dB before the "severe impact" criterion is exceeded). If the existing noise environment in the same area is 70 dBA, a transit project may contribute an additional 1 dB before the "impact" criterion is exceeded (3 dB before the "severe impact" criteria is exceeded). Where no sensitive land uses exist, FTA criteria do not apply.


N
SCALE
0 500 1000 1320 FEET
0 0.125 0.25 MILES
LEGEND
A MORNING PEAK-HOUR NOISE RECEPTOR LOCATIONS
P AFTERNOON PEAK-HOUR NOISE RECEPTOR LOCATIONS
1 RESIDENTIAL GROUND VIBRATION RECEPTOR LOCATIONS
WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
MARKET ST.
MISSION ST.
TRANSBAY TERMINAL
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HOWARD ST.
HAWTHORNE ST.
TEHAMA ST.
CLEMENTINA ST.
1ST ST.
ESSEX ST.
2ND ST.
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST.
STEUART ST.
THE EMBARCADERO
BAY BRIDGE
80
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
3RD ST.
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
SOUTH PARK
STANFORD ST.
DELANCEY ST.
COLIN P. KELLY ST.
KING ST.
BERRY ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN TERMINAL STATION
CHANNEL ST.
CHINA BASIN ST.
MISSION ROCK ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
280
OWENS ST.
HOOPER ST.
IRWIN ST.
HUBBEL ST.
16TH ST.
DAGGETT ST.
THIRD ST.
ILLINOIS ST.
17TH ST.
MARIPOSA ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
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5
6

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SENSITIVE NOISE RECEPTOR LOCATIONS

Figure 5.8-1

Table 5.8-1 summarizes FTA ground-borne vibration and ground-borne noise criteria for various land use categories. As shown, 65 to 75 VdB[7] represents the range where "frequent" vibration events (occurring more than 70 times per day) would become unacceptable. Slightly different criteria exist for special land uses such as concert halls, TV and recording studios, and theaters, although no such uses are known to exist close enough to the proposed CalTrain alignment to be affected. Thirty-five to 40 dBA represents the range where "frequent" ground-borne noise events would become unacceptable.

Table 5.8-1
FTA Ground-Borne Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne Vib. Impact (VdB re 1 micro inch/sec)		Ground-Borne Noise Impact (dB re 20 micro Pascals)	
	Frequent [1] Events	Infrequent [2] Events	Frequent [1] Events	Infrequent [2] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB [3]	65 VdB [3]	N/A [4]	N/A [4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

Notes:
1. "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Not Applicable. Vibration-sensitive equipment is not sensitive to ground-borne noise.

Source: Harris Miller Miller & Hanson, Inc., September 1995

It should be noted that train vibration is virtually always characterized in terms of root-mean-square (RMS) amplitude. RMS represents the average energy over a short time interval (typically one second), and is considered the best available measure of potential human annoyance from ground-borne vibration. RMS is distinct from peak particle velocity (PPV), which is the vibration measurement typically used to monitor for potential building damage from construction activities, and which represents the maximum instantaneous peak in the velocity of an object's vibratory motion.

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[7] Vibration is an oscillary motion which can be described in terms of the displacement, velocity, or acceleration of the oscillations. Ground-borne vibration is usually characterized in terms of the vibration velocity, and is given in terms of either inches per second or decibels. Decibels are used here, and the abbreviation "VdB" is used to avoid confusion with noise decibels.

5.8.3 Train Noise

Because train noise is a concern where trains are at or above ground level, train noise from the CalTrain Extension Alternative was projected for areas where train operation would be at grade for all three Townsend Street Alignment Options. Projections were based on formulas included in the FTA manual, *Transit Noise and Vibration Impact Assessment*, and on measurements of noise from current CalTrain operations near the existing Fourth and Townsend Streets Station. Also factored-in were estimates of train speed, distance to the receptor(s), and the number of trains per day.[8]

Under all Townsend Street Alignment Options, trains would operate above ground along Seventh Street; under the Townsend-Center and Townsend-South Side Options, trains would also travel at grade along Townsend Street, stopping at a surface station between Fifth and Sixth Streets. Relevant sections of Seventh and Townsend have few noise sensitive receptors. As a result, no impacts from train passby noise are projected. However, there are buildings with commercial, industrial and office uses along the at-grade sections, where employees and visitors could perceive train noise. The projected Day-Night Equivalent Level (Ldn) would be 66 dBA at 50 feet from the tracks, which is representative of the buildings that would be closest to the tracks. This level is lower than all but one of the long term measurements that were performed in this area, supporting the conclusion that there would be no substantial or unacceptable change in noise levels as a result of above-ground train operations.

5.8.4 Traffic Noise

Traffic noise was assessed by comparing traffic volumes on local streets under the Build and No-Build Alternatives, and by calculating the change in noise that would result from any change in traffic volumes. While it is generally accepted that a change in traffic noise (increase or decrease) of less than 3 dB is not perceptible to most humans, the current study assumes that changes in noise levels of 1 dB or more may be perceived. Table 5.8-2 contains a partial list of the streets and intersections that were included in the traffic noise assessment, including all those where the projected noise exposure increase was greater than 1 dB. (Each direction was analyzed independently to make sure that noise impacts from traffic increases in one direction were not obscured by a smaller change in the opposite direction.) Results show the projected traffic volume for each option and noise exposure increase.

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[8] Measurement results indicate that the maximum sound level from a CalTrain train passing at 25 to 30 mph is 84 dBA at 50 feet from the track centerline.

As shown in Table 5.8-2, the only area where the projected increase in traffic volume would cause more than a 2 dB increase in noise is along Essex Street, from Folsom Street to the Bay Bridge. This increase could occur during the morning peak hour for traffic traveling southeast (onto Interstate 80), due to the shifting in traffic from the First Street on-ramp to the Essex Street on-ramp, should an extension of Essex Street from Howard Street to Folsom Street be constructed as part of this project.

Table 5.8-2
Summary of the Maximum Changes in Noise Levels Anticipated as a Result of Project-Related Changes in Traffic Volumes on Selected Streets

Street	Dir.	From Street	To Street	TOTAL Vehicles		Noise Level Change, (dBA) 2010 Build*
				2010 No-Build	2010 Build*	
AM Peak Hour						
Harrison St	NE	First St	Fremont	28	38	1.3
Harrison St	SW	Fremont	First St	1,180	1278	0.[illegible]
Beale St	SE	Howard St	Folsom St	438	580	1.2
Mission St	NE	Fremont	Beale St	702	884	1.0
Mission St	SW	Beale St	Fremont	378	432	0.6
Mission St	NE	Beale St	Main St	538	884	1.3
Mission St	SW	Main St	Beale St	248	256	0.1
Essex St	SE	Harrison	I-80 Ramp	296	522	2.5
Essex St	NW	Harrison	Folsom St	32	38	0.6
Essex St	SE	Folsom St	Harrison	346	508	0.6
I-80 Ramp	SE	I-80 Ramp	I-80	294	508	0.6
Second St	NW	Mission St	Market St	262	408	1.0
Second St	SE	Market St	Mission St	366	366	0.0
PM Peak Hour						
Folsom St	NE	Beale St	Main St	1,278	1614	1.0
Beale St	SE	Howard St	Folsom St	630	884	1.3
*May be incrementally less, depending on mitigation options for the Transbay Terminal, as described in Chapter 6						

Source: Harris Miller Miller & Hanson Inc., June 1996.

Land uses along all of the streets listed in Table 5.8-2 were reviewed to identify any noise sensitive uses that could be affected by the projected noise increase. There is one sensitive receptor area located along the streets identified as having an increase in noise of 1 dB or greater, i.e., an apartment/condominium complex east of Essex Street between Folsom and Harrison Streets. The additional bus traffic on Essex street traveling toward the Bay Bridge is projected to have only a minor effect on the overall noise exposure for this area, given that the Bay Bridge ramp traffic would continue to dominate the noise environment for this residential receptor.

The changes in traffic volumes and noise levels presented in Table 5.8-2 represent the worst case scenario. Mitigation options for the Transbay Terminal demolition are presented in Chapter 6, and a comparison of traffic noise impacts among the mitigation options is presented in that Chapter.

5.8.5 Potential Ground-Borne Vibration and Ground Borne Noise Impacts

To determine potential effects of train operations in the project area, a curve of ground-borne vibration levels as a function of distance was developed based on vibration propagation tests, train vibration measurements, and the generalized curve in the FTA manual. Table 5.8-3 summarizes the projections of ground-borne vibration and noise for the three possible subway curve configurations.

Based on available land use information, the six buildings listed in Table 5.8-3 are the only ones that have residential spaces and are close enough to at least one of the tunnel alignments for there to be potential for impact from ground-borne vibration or noise.[9]

As shown in Table 5.8-3, the projected levels of ground-borne vibration would not exceed the FTA impact threshold of 72 VdB at any of the sensitive receptors. Projected levels of ground-borne noise could exceed FTA impact threshold of 35 dBA at three loft buildings. The building at 501 Second Street would be just north of the long-radius curve, with the closest part of the building within 40 feet of the tunnel. The tunnel would be in bedrock at this location, reducing the level of ground-borne vibration. Nonetheless, projected levels of ground-borne noise slightly exceed the FTA threshold (by 1 dB or less) at this location. The building at 355 Bryant Street would be directly over the three tunnel alignments, which would again be founded in bedrock. The projected levels of ground-borne noise at this location would exceed the FTA threshold by 4 to 5 dB. The third building north of Bryant Street would be about 50 feet northwest of any of the tunnel alignments, which would still be in bedrock at this point. Projected levels of ground-borne vibration would be well below the impact threshold; however, projected levels of ground-borne noise would exceed the FTA impact threshold by 1 dBA or less.

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[9] In developing the projections, it was assumed that all of buildings had at least one basement. The first floor of apartment buildings and the second floor of lofts were assumed to be the first residential floors.

Table 5.8-3
Summary of Ground-Borne Noise and Vibration Projections as a Result of the CalTrain Extension Alternative with Various Tunnel Alignment Options

Location/Receptor	Alt. *	Dir.	Spd (mph)	Distance, ft		Tunnel Foundation	Proj. GB Noise and Vib.	
				Horiz.[1]	Depth[2]		Vibs.[3] VdB	Noise,[4] dBA
1. 601 4th Street, The Lofts	A	NW	50	320	20	Soil	54	22
	B	NW	50	320	20	Soil	53	22
	C	NW	50	320	20	Soil	53	22
2. Steamboat Point Apts.	A	SE	50	320	40	Rock	43	26
	B	SE	40	225	50	Rock	58	29
	C	SE	40	60	55	Rock	58	33
3. South Beach Marina Apartments	A	SE	50	560	40	Rock	43	21
	B	SE	40	430	50	Rock	44	22
	C	SE	40	40	55	Rock	52	39
4. 501 Second St. (Lofts)	A	SW	50	40	30	Rock	58	**36**
	B	SW	50	40	30	Rock	58	**36**
	C	SE	50	40	35	Rock	58	**36**
5. 355 Bryant Street (Lofts)	A	NE	50	0	30	Rock	62	**40**
	B	NE	50	0	35	Rock	61	**39**
	C	NE	50	0	35	Rock	61	**39**
6. North of Bryant (Lofts)	A	SW	50	50	25	Rock	58	**36**
	B	SW	50	50	25	Rock	58	**36**
	C	SW	50	50	25	Rock	58	**36**

* Options: A-long radius curve, B-medium radius curve, and C-short radius curve

1. Horizontal distance from track centerline to closest part of building foundation in feet.
2. Depth of subway tunnel, assuming a ten foot deep basement in buildings.
3. Projected ground-borne vibration in terms of root-mean-square (rms) vibration velocity in decibels with a decibel reference of 1 μin/sec.
4. Projected ground-borne noise inside building in terms of A-weighted sound levels. The impact criterion for ground-borne vibration is 72 VdB, and the impact criterion for ground-borne noise is 35 dBA.

Source: Harris Miller Miller & Hanson Inc., June 1996.

5.8.6 Mitigation Measures

There are three buildings where projected levels of ground-borne noise would exceed the impact threshold for residential land uses, but none where ground-borne vibration projections exceed the threshold. The subway would be founded in rock in areas where impacts could occur, which means that the vibration would be a relatively high frequency. As a result, it should be possible to mitigate ground-borne noise impacts with appropriately designed trackforms. The project design would be modified to incorporate one of the following two mitigation options: high-resilience track fasteners or resiliently supported tie systems. These trackforms have been successfully used on both rail transit and commuter rail systems. No other noise or vibration impacts would occur from operation of the Build Alternative, and no other mitigation is therefore warranted.

5.9 GEOLOGY AND SEISMICITY

This section focuses on the potential for geologic or seismicity features of the project area to affect the proposed project, or for the project to increase the potential exposure of people to hazard from geologic or seismic risks. In this context, the No-Build Alternative does not have potential impacts, but serves as a basis of comparison with the CalTrain Extension Alternative.

5.9.1 Geology

The primary geologic elements that could affect the proposed CalTrain Extension project include Bay Mud and artificial fill. Impacts associated with these elements can be mitigated through appropriate design and are discussed below.

Bay Mud overlain by artificial fill would be encountered beneath much of CalTrain Extension Alternative, and would be the primary factor potentially affecting non-seismic settlement of the storage yard, surface tracks, rail stations, and cut-and-cover subways. Differential settlement of Bay Mud is expected to occur within the storage yard and along the surface tracks; however, the degree of settlement is expected to be relatively minor.

Without appropriate foundation support, settlement of the rail facilities would occur due to the presence of the mud. With respect to cut-and-cover and station construction, the low strength and moderate deformation characteristics of Bay Mud could affect the stability of the face of the tunnel, the stability of excavations, the degree of ground deformation caused by the excavations, and the resulting response of adjacent structures.

Fill soils possess adverse characteristics such as rubble, heterogeneity of composition and depth, and locally high permeability. Similar to Bay Mud, these characteristics could affect the stability of excavations and resultant ground deformations.

For a discussion of bedrock expected to be encountered during project construction, and proposed construction techniques for tunneling through this bedrock, See Section 5.20.2 -- Construction Activities.

5.9.2 Seismicity

Seismically-induced ground shaking could damage the proposed CalTrain Extension subway and associated structures. Within the study area, the primary hazards related to seismically-induced ground motion are liquefaction and associated ground deformation (e.g., subsidence and lateral spreading). Portions of the alignment underlain by soft sediments are also susceptible to amplified ground motion. Areas of concern regarding seismic-related impacts may be grouped into two categories: (1) surface track components of the project including both storage yard options and main lines; and (2) structural components including the tunnel, the surface station near Fifth Street, and the underground terminal.

Surface Tracks. For surface tracks, seismic shaking may cause subsidence and lateral spreading of the ground surface as a result of liquefaction of saturated fill soils. This type of ground deformation could damage or obstruct the main lines and limit use of the storage yard until track repairs are completed. This impact would be the same for the Townsend-Center and Townsend-South Side alignment options, however, the impacts are expected to be less for the Townsend-South/Subway Alignment Option. This is because surface tracks presently located between the proposed Fourth and Seventh Street portals would be relocated into the Townsend Street cut-and-cover subway which, except near the portal, would have an invert elevation (lowest part of the subway) below the bottom of fill deposits.

Structural Components For the Townsend-South/Subway Alignment Option, the cut-and-cover section along Townsend Street would intersect Bay Mud between the proposed Berry Street portal and Fourth Street. Bay Mud extends to depths of almost 100 feet below the ground surface along this portion of the segment. Because Bay Mud is a primary contributing factor to ground motion amplification during earthquakes, this section of the Townsend Street segment is considered to be the most susceptible to amplified ground motion of any portion of the proposed project alignment. As noted above, liquefaction of fill soils should not affect the cut-and-cover subway because its invert depth lies below the base of the fill layer.

For the Townsend-Center and -South Side alignment options, the cut-and-cover subway would encounter Bay Mud only immediately east of the 4th Street portal. Although fill soils along the tunnel alignment are susceptible to liquefaction, the proposed subway depth should place the subway invert below the bottom of fill deposits, except at the portal.

The mined tunnel segment between 3rd and Folsom Streets would be the least affected by ground motion and should not have major ground deformation related to earthquakes, regardless of the alignment option.

Up to 50 feet of soil sediments consisting of fill, Bay Mud, and loose to medium dense marine sands would be encountered along the northernmost cut-and-cover segment between Folsom Street and the new underground terminal. The invert elevation of the subway would be below the base of the fill layer, thereby mitigating liquefaction hazards associated with the fill. However, the subway may be subjected to amplified ground motion. The potential liquefaction hazard associated with the marine sands is considered to be minor.

The Mission Bay surface station and underground CalTrain terminal proposed in the Build Alternative are underlain by fill and Bay Mud and, therefore, may be subjected to liquefaction and amplified ground motion. However, since these stations would be supported on deep foundations, the effects of liquefaction and earthquake ground motion would be minimal.

5.9.3 Mitigation Measures

The geologic impacts and seismic concerns discussed above are similar to those associated with numerous high-rise buildings in downtown San Francisco, and with the BART and Muni tunnels. Mitigation of these impacts would be accomplished through the application of geotechnical and structural engineering principles and conventional construction techniques, similar to the design and construction of high-rise buildings and tunnels throughout the downtown area.

Consistent with current practice along other portions of the CalTrain corridor that overlie soft soils, potential settlement of the storage yard and surface tracks is best mitigated by regular maintenance of the tracks. Track repairs would be performed as part of CalTrain's ongoing track maintenance program.

Potential settlement of the surface and underground stations would be mitigated through proper design and construction of pile supported foundations for both structures. Stability of the excavations for both stations and the resultant impacts on adjacent structures can be controlled within tolerable limits by proper design and implementation of the excavation shoring systems.

Mitigation of seismic impacts on surface tracks may be handled in two ways: reinforcement or stabilization of soils beneath the tracks, or implementation of contingency plans for rapid repair of damaged rails resulting from ground shaking. Reinforcing or stabilizing soils beneath the rails is very expensive and may not guarantee that the tracks would remain operable after a strong earthquake. Consistent with current practice along other portions of the CalTrain corridor that overlie soft soils, potential impacts due to seismically induced ground motion are best mitigated by provisions for rapid rail repair. At present, these provisions include emergency communications links and work stations to expedite mobilization of personnel and equipment to damaged areas.

Structural components of the project would be designed and constructed to resist strong ground motions approximating the maximum anticipated earthquake (0.5g). The cut-and-cover portions along Townsend and Essex Streets would require pile supports to minimize non-seismic settlement in soft compressible sediments (Bay Mud). These supports would also serve to minimize settlement and lateral displacement resulting from seismic shaking. The mined tunnel segment would require minimal additional reinforcement to withstand seismically-induced ground motion. The above-ground Mission Bay station and underground CalTrain terminal would require pile-supported foundations due to the presence of underlying soft sediments. These foundation designs combined with seismically resistant building structures should adequately mitigate seismic impacts to the stations.

5.10 WATER RESOURCES

No impacts to surface or groundwater resources would result from the No-Build Alternative. Under the CalTrain Extension Alternative, piles would be used to support the cut-and-cover sections, the underground rail station, and the surface rail station in areas underlain by Bay Mud. Although the piles could create a conduit for contaminants in shallow groundwater to migrate to deeper groundwater zones (as discussed in Section 5.21.14), the geotechnical properties of Bay Mud suggest that a tight seal will develop around the piles, minimizing downward migration of contaminated groundwater.

The proposed Mission Bay surface station between Fifth and Sixth Streets along Townsend Street and either storage yard option would slightly increase the amount of impervious surface area within San Francisco. During storm events there could be a slight increase in surface water runoff. The surface station and storage yard would include collection and conveyance structures that would deliver runoff from those facilities to the existing combined storm/sanitary sewer system. The water would then be transported to a sewage treatment plant near Phelps and Jerrold Streets and treated prior to discharge. The increase in the amount of surface water runoff created by the proposed project would be minor.

No mitigation measures are required for these impacts to water resources.

5.11 FLOODPLAIN

No portions of the alignment cross surface water bodies, including creeks or reservoirs. Also, according the City and County of San Francisco Planning Department, no portions of the project area lie within recognized flood hazard zones with the exception of potential tsunami inundation. No flood hazard zones have been mapped by the Federal Emergency Management Agency (FEMA) in San Francisco.

5.12 UTILITIES

Options within each segment of the CalTrain Extension Alternative would require relocation of existing underground and overhead utilities located in the project area. The density of underground utilities encountered generally increases as the alignment options approach the proposed underground terminal site.

Utilities intercepted or blocked by the proposed subway structure have the greatest potential impact. Pressure lines would be rerouted over the subway but gravity sewer lines would have to be rerouted around the subway sections or routed over/under by siphon and/or pumping. Large consolidation sewers are especially problematic. Rerouting of these sewers would require extensive planning and coordination with the Department of Public Works during all phases of design and construction.

Utilities exposed by cut-and-cover excavation would need to be addressed. Utilities crossing the alignment would typically be supported in place from the excavation cross-bracing. Large utility crossings (36-inch and larger) may require specially designed supporting structures. Longitudinally running utilities would be permanently relocated outside the excavation area or temporarily supported along the side of the excavation, then permanently relocated over the subway during street restoration. Utilities located beneath at-grade sections would experience few impacts. They would be relocated adjacent and parallel to the alignment or sleeved/reinforced at crossings.

Potential utility impacts for each segments along 7th and Townsend Streets of the project are described below.

5.12.1 Townsend Street Segment

Townsend Street-Center and -South Side Alignment Options. Along Seventh Street, the proposed Townsend Street Center and South Side Options would be located east of the existing street right-of-way and are primarily at-grade. The most important utility encountered in this segment would be the Division Street outfall sewer, consisting of four 10-foot by 8-foot box structures and passing beneath the proposed alignments just west of the China Basin Channel. Conflicts with this structure would be avoided by keeping the alignments at-grade along Seventh Street. The other major utility in this segment is a 66-inch sludge force main sewer which passes beneath the electrical substation at the proposed maintenance and storage yard east of Seventh Street. It would be relocated adjacent to the yard. Additional utilities requiring relocation and/or reinforcing sleeves would be 18-inch water and 14-inch auxiliary water lines crossing at Berry Street, and a 12-inch water line crossing near Sixteenth Street.

In the Townsend Street portion, the alignments would continue at-grade from Seventh Street to Fifth Street, descend from at-grade to subway east of Fifth Street, and continue east down Townsend Street below grade. The subway portion would be constructed by cut-and-cover. The potentially greatest utility impact along Townsend Street is a 78-inch RC sewer crossing at Fourth Street, which would require rerouting around the project. The Townsend Street-Center alignment centerline would be located south of street centerline, leaving approximately 30 feet on the north side of the right-of-way undisturbed by the construction and providing room for relocation of utilities from the south side of the street. The Townsend-South Side alignment centerline would be south of the existing street right-of-way and would affect fewer parallel utility lines.

Townsend Street-South/Subway Alignment Option. This alignment option would begin the transition to subway near Hooper Street and is fully below grade by Berry Street. This alignment option would affect the four ten-foot by eight-foot box sewers (Division Street Outfall) which empty into China Basin. The City has conducted preliminary studies on this structure and has determined that the four existing box structures may be replaced with several lower height box structures at a lowered invert elevation.

Along Townsend Street, the South/Subway Option would be entirely below grade. The subway portion would be constructed by cut-and-cover. Under this option, the alignment centerline would be located south of the street centerline, leaving approximately 30 feet on the north side of the right-of-way undisturbed and providing room for relocation of utilities from the south side of the street.

Other potential utilities impacts of this Townsend Street option would include the need to reroute the 12-inch waterline near Hooper Street, and to support the 12-inch waterlines in Berry and Sixth Streets and the existing 72-inch and 10-foot by 7-foot RC sewers in Sixth Street in place during construction.

5.12.2 Mined Tunnel Segment

From near Third Street eastward, the construction method would change from cut-and-cover to mined tunnel, curving northward from Townsend Street under Rincon Hill to just northward of Folsom at Essex Street. Three alternative mined tunnel alignments are proposed.

The Medium-Radius Curve/Medium Mined Tunnel would pass below the basement of the saltwater pumping station at Second and Townsend Streets, operated by the San Francisco Fire Department as part of the auxiliary water supply system. The Short-Radius Curve/Long Mined Tunnel would pass below the five-foot diameter salt water intake tunnel located on the north side of Townsend Street, connecting the pumping station to the Bay near the intersection of Townsend Street and The Embarcadero. Construction of the mined tunnel is not expected to affect these portions of the auxiliary water system, because the mined tunnel alignments would be 9 to 10 feet below the pumping station or intake tunnel, and the utilities would be supported via pressure grouting if required.

5.12.3 Folsom Street to the Transbay Terminal Segment

North of Folsom Street the proposed construction method would be cut-and-cover. The alignment would continue north from the end of Essex Street and curve eastward to the site of the Transbay

Terminal between Natoma and Minna Streets. The cut-and-cover alignment and CalTrain terminal would cross Howard, Clementina, Tehama, Natoma, First, Fremont, and Beale Streets.

Utilities at the street crossings and within the easterly portions of Natoma and Minna Streets may be affected during construction due to their proximity to the station excavation. Utilities present include the 3 foot by 5 foot brick sewers at the crossings of Howard, Natoma, and First Streets. These segments would require replacement with RC box sections that would be supported in place during construction. Other potential utility conflicts during construction include 4 inch and 8 inch potable water mains, 10 inch and 12 inch auxiliary water mains, and 2 inch gas mains that cross the excavation areas and would require support during construction.

5.12.4 Mitigation

Careful and continuous coordination with utility providers would be initiated during preliminary engineering and would continue through final design and construction. Utilities would be avoided, relocated, and/or supported as necessary during construction activities in order to prevent damage to utility systems and to minimize disruption and degradation of utility service to local customers. Coordination efforts would focus on identifying potential conflicts, planning utility reroutes, and formulating strategies for overcoming problems that may arise.

5.13 ELECTROMAGNETIC FIELDS

No electromagnetic field emissions in addition to those presently experienced would result from the No-Build Alternative. Under the CalTrain Extension Alternative, people may be exposed to electromagnetic fields (EMF) by either the dual mode operation or full system electrification propulsion options. Exposure would be greater with the full system electrification propulsion option. In addition, catenaries associated with the Municipal Railway would be relocated from their present location in front of the Transbay Terminal to Beale Street or to the Beale-Fremont pass-through. EMF intensities around electric trains vary considerably. The greatest potential fields and chance of exposure would be within rail cars and at stations. Stations would increase exposure to boarding and alighting passengers and any CalTrain workers, security, or other personnel who would spend time in station areas.

Strong electromagnetic fields are not associated with the normal environment and the operation of passenger trains, however. Measurements of average magnetic fields for catenary powered rail vehicles have ranged from approximately 400 mG at head level to 1,500 mG at floor level.[10] The field strengths at head level approach exposures found at the earth's magnetic poles (600 mG). The duration of exposure to EMFs from transit systems is relatively brief in comparison to the daily exposure from office equipment and household appliances, electric power lines, and other electrically powered machines. At present, the preponderance of evidence from exposure studies for general power sources would suggest that the increased risk of cancer and other diseases is extremely small for conventional, electrified transit systems.

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[10] *Safety of High Speed Guided Transportation Systems, EMF Exposure Environments Summary Report,* Table 4-3. The dominant source of magnetic field generation is the traction power and control equipment.

No mitigation of EMF exposure from the CalTrain Extension project is recommended. Should future scientific studies indicate a health risk to passengers and/or workers, mitigation measures to shield or limit exposure would warrant consideration.

5.14 HISTORIC AND CULTURAL RESOURCES

The regulatory framework governing treatment of historic and cultural resources is detailed in Section 4.16. This DEIS/DEIR affords the State Historic Preservation Officer (SHPO) early notice pursuant to California PRC 5024.5(a), of a project potentially affecting resources listed in, or eligible for, the California Register of Historic Resources. A Finding of Effects report will be prepared and submitted to the SHPO once a preferred alternative is selected by the JPB following public circulation of this DEIS/DEIR.

There are no potential impacts to historic and cultural resources as a result of the No-Build Alternative. Consequently, the remainder of this section focuses on potential impacts of the CalTrain Extension Alternative.

5.14.1 Archaeological Resources: Impacts

Prehistoric Archaeology

Although no known prehistoric archaeological sites have been documented within the project Area of Potential Effects (APE), there is potential for the discovery of unidentified sites. Appropriate procedures for the treatment of such finds would be in place as described in the Mitigation section below.

Historic Archaeology

Twenty-four known or potential site locations of historic archaeological resources have been identified within or near the alignment segments of the CalTrain Extension Alternative. These are listed by number in Section 4.16, Table 4.16-1.

Traditionally cited or documented locations of subsurface archaeological resources are necessarily approximate. Nearly all of the APE is covered by buildings or pavement, and the precise locations, integrity, and research potential of any of the potential archaeological resources discussed herein cannot be determined without subsurface investigation potentially disrupting streets, buildings, and other structures. An archaeological Research Design and Treatment Plan will be prepared once detailed construction plans for the proposed project are approved. This plan will govern testing, evaluation, and assessment of impacts to any such resources, and describe appropriate treatment strategies.

Site listed below under the segments are deemed to be the most likely for possible impacts.

Townsend Street Segment Alignment Options. Because the locations identified for the potential resources in the vicinity of the Townsend Street alignment options are approximate and the alignment options are in close proximity of one another, impacts to the following sites could occur with any of the three Townsend Street options.

- Site 2 (shipyards) is located adjacent to Seventh Street and the proposed Seventh Street portal site. It could be affected by alignment trenching and portal construction, if this portal location were selected.
- Site 5 (Tiernan or Owen Wharf) is located adjacent to the north side of Townsend Street, east of Fourth Street, and could extend into the Townsend Street alignment and be affected by cut-and-cover trenching for any of the three Townsend alignment options.
- Site 6 (Marcucci & Tiernan Shipyards) is located south of Townsend Street and east of Fourth Street. It could be affected by cut-and-cover trenching for any of the three Townsend alignment options.
- Site 7 (San Francisco Glass Works) is located at the southwest corner of Third and Townsend Streets. This site could also be affected by cut-and-cover excavation for any of the three Townsend alignment options.

Mined Tunnel Segment Alignment Options. None of the identified sites is likely to be disturbed by mined tunnel construction, primarily because the depth of tunneling contemplated is below the probable depth of historic archaeological deposits. Exceptions are noted below.

- Site 19 (Chinese Fishing Village/Wilson, Tardiff and Bells Shipyard), located on the **Short-Radius Curve/Long Mined Tunnel Alignment**, between Brannan Street and Federal Way, could be affected by construction of the access shaft, ventilator shaft, and fan room on Brannan Street. The excavation of soils from ground surface to the underlying bedrock could affect deposits associated with the Chinese village and/or the shipyard. Similar impacts are possible with the **Medium-Radius Curve/Medium Mined Tunnel Alignment Option**.
- Site 11 (Wilson, Tardiff and Bells Shipyard/Pacific Mail Steamship Company), located on the north side of Townsend Street to Brannan Street on both sides of the **Short-Radius Curve/Long Mined Tunnel Alignment**, could also be affected by excavation of soils during access shaft, ventilator shaft, and fan room construction.

Folsom Street to the Transbay Terminal Segment. One historic archaeological site within the APE in this segment of the CalTrain Extension Alternative alignment could be affected, as follows:

- Site 20 (Happy Valley Gold Rush Camps) could be affected by project excavations if deposits extend into this segment of the APE.

New Underground CalTrain Terminal at the Transbay Terminal Site.

- Site 17 (brig Trescott or Calleo), located along Beale Street south of Mission Street, is likely outside the project APE, but possibly within, meaning that the possibility for impacts to the resource from underground terminal construction cannot be ignored.

- Site 20 (Happy Valley Gold Rush Camps) could be affected by project excavations, as described above.

5.14.2 Archaeological Resources: Mitigation

Mitigation measures for archaeological and historic architectural resources would be set forth in a Memorandum of Agreement (MOA) to be executed by the JPB, FTA, Caltrans, ACHP, and SHPO, as appropriate.

Archaeological Research Design and Treatment Plan

Based upon the MOA requirements, the JPB would employ an Archaeological Research Design and Treatment Plan approach to avoid and mitigate potential impacts to archaeological resources. This approach would provide for organizing the various phases of archaeological work — identification, evaluation, and data recovery — into a single pre-approved plan covering the treatment of all on-site archaeological properties, and help to avoid lengthy interruptions of construction activities. The Plan would cover any additional archaeological research investigation standards and procedures, field excavation strategies, monitoring, artifact handling and analysis procedures, treatment of human remains, and ownership and curation of materials. Requirements for final reporting of all field methods, results, and findings would also be specified. Finally, the Plan would ensure that all federal and State laws and regulations regarding the treatment of Native American cultural materials and Native American burials would be adhered to, including appropriate notification of the California Native American Heritage Commission and local Native American organizations regarding findings of Native American artifacts.[11]

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[11] Reference would be made to the Archaeological Research Design/Treatment Plan for the Embarcadero Freeway Replacement/Terminal Separator Structure Project, Holman & Associates, 1996, which covers a similar geographic area and deals with many of the same potential archaeological resources as the proposed CalTrain project.

The Plan would be developed with the coordination and concurrence of ACHP, FTA, SHPO, JPB, and Caltrans, in accordance with ACHP and the Secretary of the Interior's standards and guidelines (36 CFR 800.9 (c) (1)). The various phases of work would be performed under the supervision of professional archaeologists who meet or exceed the Secretary of the Interior's qualification standards.

Copies of the final reports on these archaeological investigations would be provided to the ACHP, SHPO, the Historical Resources Information System, the Northwest Information Center of California Archaeological Inventory, the San Francisco Planning Department, and the San Francisco Public Library.

If human remains are encountered during construction, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code 5097.88.

5.14.3 Historic Architectural Resources: Impacts

Historic architectural resources identified within the project APE consist of individual buildings and structures, and the Rincon Point/South Beach Historic Warehouse-Industrial District (locally known as the South End Historic District). Resources listed on or determined eligible for listing on the NRHP, either individually or as contributors to the historic district, are identified in Table 4.16-2.

The CalTrain Extension Alternative to the Transbay Terminal Site would require demolition and removal of the Transbay Terminal and the loop ramp, both of which are contributory elements to the San Francisco-Oakland Bay Bridge, an NRHP-eligible resource. This demolition would constitute an adverse effect on the historical resource under Section 106.

Although tunneling under portions of the Rincon Point/South Beach Historic Warehouse-Industrial District would be required, no long-term impacts to individually eligible or listed structures and contributors to the historic district are expected. Temporary construction impacts to these resources are discussed in Section 5.21.13.

5.14.4 Historic Architectural Resources: Mitigation

Mitigation measures will be set forth in a Memorandum of Agreement (MOA) to be executed by the JPB, FTA, Caltrans, ACHP, and SHPO, as appropriate. They could include measures as discussed below.

There is no potential for relocation of the historic property and conveyance of title to another party in the case of the Transbay Terminal and terminal loop ramp. Therefore, recordation is suggested to ensure a permanent record of the properties' present appearance and context. Under this mitigation proposal, FTA would ensure that the Transbay Terminal and terminal loop ramp would be recorded to Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) standards prior to any construction activities. The HABS/HAER documentation would be filed with the SHPO, the HABS/HAER collection in the Library of Congress, the University of California Bancroft Library, the San Francisco Landmarks Preservation Advisory Board files at the San Francisco Planning Department, and the San Francisco Public Library.

JPB staff and Caltrans would develop a display of the photographs produced in the HABS/HAER documentation, for public exhibition. This display would be provided by JPB in the planned new combined bus/rail terminal or at either the proposed new CalTrain terminal or replacement bus facility.

After recordation and at least 30 days prior to demolition, FTA would ensure that the SHPO or its designee has the opportunity to salvage architectural elements for re-use or curation. FTA would ensure that the items selected are removed in a manner that minimizes damage and that they are delivered to the SHPO or its designee.

Although recordation mitigates the severity of the effect of demolition, it does not prevent the tangible loss of historically significant properties. (Please also see Chapters 9 and 11 of this document.)

5.15 HAZARDOUS MATERIALS

This section focuses on the risk of exposure to or releases of hazardous materials from CalTrain Extension-related operations. Impacts of hazardous materials sites related to construction of the CalTrain Extension Alternative are discussed in Section 5.21.14.

Impacts from Hazardous Materials Used in Train Operations

The proposed storage yard options would contain a fueling facility to provide diesel to locomotives. Cleaning solvents would also be present on the site. This facility would involve services similar to those at the current CalTrain yard and, therefore, potential impacts would be similar to those under the No-Build Alternative; however, the location of the yard would change under the proposed project.

Mitigation Measures

The fueling facility would be constructed and operated to comply with local, State and federal regulations regarding handling and storage of hazardous materials. Diesel fuel pumps would be equipped with emergency shut-off valves and the storage tanks would be equipped with a leak detection and/or secondary containment system. These safeguards would limit the amount of diesel fuel that could spill, provide early detection in the event the storage tank should leak, and provide secondary containment to prevent the material from contaminating soil or groundwater. Cleaning solvents would be stored in 55-gallon drums within a bermed area to provide secondary containment. Paved surfaces within the fueling facility and the solvent storage area would be sloped to a sump where liquids could be collected and treated prior to disposal at an appropriate facility.

Handling and storage of fuels and solvents will follow California OSHA standards for fire protection and prevention. These measures include appropriate storage of flammable liquids and prohibition of open flames within 50 feet of flammable storage areas. Measures in addition to the handling and storage procedures described above are not warranted.

5.16 VISUAL/AESTHETICS

Visual changes attributable to the CalTrain Extension are described in this section, with resulting changes to views currently enjoyed by residents and other users of the area.

5.16.1 No-Build Alternative

Under the No-Build Alternative, there would be no visual changes to the project area. The Transbay Terminal would remain in its current configuration and location. Elevated ramps to the Terminal would continue to loop through the area, and the existing CalTrain terminal would remain at Fourth and Townsend Streets.

5.16.2 CalTrain Extension to Transbay Terminal Site Alternative

Under the CalTrain Extension Alternative, visual changes would occur at the new terminal and storage yard, at locations where new surface stations, tracks, and portals are proposed, and where electrification facilities are proposed.

Existing Terminal and Storage Yard Area

The CalTrain Extension Alternative would eliminate the existing CalTrain terminal at Fourth and Townsend Streets, which would result in visual changes when the existing building and rail yard are removed. CalTrain currently stores trains in this station area; this activity would be moved to one of two sites.

A new storage yard would be visible either south of Townsend Street between Fifth and Seventh Street, or west of Owens Street, between Hubbell and Sixteenth Streets. Visible railroad features and activities within either storage yard option, or along any proposed surface tracks, would not be substantially different than activity anticipated under No-Build conditions, and all affected areas are currently dominated by railroad and/or other transportation facilities such as the elevated I-280 structure.

Townsend Street Alignment Area

Other visual changes would occur in the existing CalTrain terminal area for Townsend Street Alignment area. The Townsend-Center and Townsend-South Side options would introduce a surface station between Fifth and Sixth Streets, additional railroad tracks within or adjacent to Townsend Street, and a concrete portal through which the tracks would descend below grade. The surface station would be a new visual element in the area between Fifth and Sixth Streets, and would include two low platforms of about 680 feet in length, with canopies, signs, lighting fixtures, and other accessory features. All features would be similar to others within the downtown area, and the portal and tracks would resemble those currently nearing completion for the Muni Metro light rail along the Mid- and South Embarcadero, although the portal could be enhanced via architectural design and landscaping treatments.

Landscaped areas would be included adjacent to the railroad tracks, either in the median of Townsend Street, or south of Townsend Street.

Portals and depressed track sections can be of concern, in terms of urban design, if they restrict pedestrian and vehicular access across the right-of-way, acting and appearing as a barrier between one section of a neighborhood and another. In the Townsend-Center and Townsend-South Side options, at-grade access across the tracks would be necessary should Berry, King, Fifth, and Sixth Streets be extended in the future, and the portal/depressed track would separate developed areas north of Townsend Street from the development parcel to the south.

Under the Townsend-South/Subway Option, the depressed track and portal would be located adjacent to Seventh Street, also separating developed areas (to the west) from rail yards (to the east).

Transbay Terminal Area

The new CalTrain terminal would be located underground on the site of the existing Transbay Terminal. Although above ground visual features associated with the terminal would be limited to entrances and exits, demolition of the existing bus facility would be required. The visual implications of this impact and proposed replacement options are described in Chapter 6.

Catenary Wires and Substations.

Under all propulsion options, locomotives operating along tracks generally north of the 22nd Street Station would be powered by electricity, and therefore catenary wires suspended on poles would be visible along all at grade track sections. Under the Townsend-Center and Townsend-South Side options, these wires and poles would be visible between the 22nd Street Station and the portal just west of Fourth Street. Under the full system electrification option, electric powered locomotives would be used all along the CalTrain route, and catenary wires and poles would be introduced throughout the 78-mile existing rail corridor from San Francisco to Gilroy.

Substations would be visible at selected locations along all sections of electrified track. Under the dual mode propulsion options, two substations would be required, one near the intersection of Folsom and Essex Streets, on top of the subway tunnel and underneath the elevated bus ramps, and one near the intersection of Seventh and Channel Streets, underneath the I-280 freeway. In both cases, power would be supplied by underground cables, and visible features would be limited to the one story (25 by 50 feet) building, accessory fencing, and an access driveway.

Under the full system electrification option, slightly larger substations are proposed at the following five locations: on the southwest corner of 23rd and Iowa Streets, underneath the I-280 freeway; in Burlingame between Carolan Avenue and the CalTrain tracks, about 600 feet south of Broadway; in Mountain View, between Evelyn Avenue and the CalTrain tracks, about 1,100 feet south of Castro Street; in south San Jose, near the Blossom Hill Road overcrossing of Monterey Highway; and in San Martin, just east of the San Martin CalTrain Station. Power would be supplied via underground cables or overhead wires, and visible features at each location would include several structures, including a one story (20 by 40 feet) building, a transformer, and other electrical equipment, accessory fencing, and an access driveway.

The introduction of catenary wires, poles, and substations within or adjacent to an existing railroad corridor would constitute a small visual change, barely noticeable to all but those most familiar with the area. Visual changes would be more noticeable at the storage yard, where there would be multiple catenary wires.

5.16.3 Changes to Scenic Views or Vistas

No scenic views or vistas have been identified along the Townsend Street corridor, or in the vicinity of Fourth, Fifth, Sixth, and Seventh Streets where the project would introduce new visual elements. No changes have therefore been identified.

5.16.4 Mitigation Measures

As explained above, visual features that would be introduced by the project are commonly accepted in urban areas and would not divide any established neighborhood or change any scenic view or vista. For this reason, no mitigation measures are required, although the project proposes to include landscape features along Townsend Street under the Center and South Side options.

Mitigation measures to address removal of the existing Transbay Terminal are discussed in Chapter 6.

5.17 SAFETY AND SECURITY

Safety refers to the prevention of accidents to the riding public, employees, or others present near the CalTrain facilities. Such accidents may be caused by events such as fires, faulty equipment, improper boarding or alighting of rail vehicles, or train/automobile/pedestrian/non-motorized vehicle collisions. Security refers to the prevention of unlawful acts resulting in harm to persons or damage to property. In a broader sense, it also implies freedom from threats or uncertainty about the likelihood of threatening acts. In this context, the No-Build Alternative does not present potential impacts; therefore, this section focuses on the proposed project.

5.17.1 Safety and Security in Station Areas

Passengers exiting the CalTrain stations either at Fifth and Townsend or the underground terminal at the Transbay Terminal site would be transferring to another form of public transit or walking to their destination. The Fifth and Townsend Street Station would be lighted, include landscaped and/or fenced buffers from adjacent streets, and have designated walkways for pedestrians and sheltered boarding and alighting areas for bus passengers. These facilities would represent a substantial improvement over existing conditions.

Passengers disembarking at the underground terminal would gain access to other public transportation directly upstairs at street level. There could also be an underground concourse connecting the CalTrain Station and bus facility to the Embarcadero BART/Muni Metro Station. Passengers disembarking at either station and walking to their destinations would use existing sidewalks and crosswalks. Pedestrian safety would not be adversely affected by the operation of either proposed CalTrain station.

Security at the CalTrain stations would be provided by the JPB via its contract with Amtrak. Security would be increased over present levels commensurate with the increase in amount of activity at the new stations. Station interiors would be open and clearly lighted and clear sight lines would be maintained. Public security would not be adversely affected by operation of either proposed CalTrain station.

Fire protection would be provided at the CalTrain stations by the San Francisco Fire Department. Fire sprinklers, stand pipes, smoke/gas detectors and alarm systems would be placed throughout the station per City of San Francisco Fire Department requirements. Public fire safety would not be adversely affected by operation of either proposed CalTrain station.

5.17.2 Safety and Security at Grade Crossings

Under the No-Build Alternative, new surface grade crossing at Berry and/or King streets could be requested by Catellus or other developers should they decide to extend these streets across the CalTrain tracks.

For the CalTrain Extension Alternative, Townsend Center and Townsend South option, new surface grade crossings could be pursued at Berry, King, Fifth, or Sixth Streets, should Catellus or other developers of the property decide to extend these streets across the CalTrain tracks. An at-grade crossing would occur for the eastbound lanes of Townsend Street under the Townsend Street-Center Alignment Option. A Sixth Street at-grade crossing could not occur for the Seventh and Townsend Storage Yard option, however.

These potential new grade crossings would present the possibility of additional train/automobile or train/pedestrian accidents. The Legislature of the State of California made public grade crossing safety the responsibility of the California Public Utilities Commission (CPUC), and no other State or local agency may usurp its authority. The Commission has stated its desire for no additional grade crossings and has noted that any proposed new CalTrain grade crossings would require careful scrutiny prior to issuance of a permit.

There are State and Federal standards for grade crossing warning devices. Local agencies are not permitted to deviate from their minimums, unless a specific order is issued by the governing agency. Any new grade crossings would be signalized.

5.18 ENERGY

5.18.1 Methodology

Energy is consumed in the construction, maintenance, and operation of transportation systems. Energy utilized to construct improvements includes not only the energy expended by equipment and ongoing activity at the worksite but also that used to manufacture equipment, materials, and supplies and transport them to the worksite. Energy for maintenance includes that of day-to-day upkeep of systems as well as the energy embedded in any replacement equipment, materials, and supplies.

Energy consumed in the operation of transportation systems is primarily the fuel used by vehicles transporting people or goods--propulsion energy. To accurately account for the total energy requirement, and to be able to compare the operations impact of one transportation system or mode with another, the energy expended to process and transport fuels should be included in propulsion energy consumption.

For instance, a gallon of diesel fuel has an energy content of 138,700 BTUs; however, the energy used in refining this gallon is approximately 8,820 BTUs, yielding a total energy equivalent of 147,600 BTUs when the fuel is consumed (ignoring transport energy, which is negligible, and the energy used in extracting raw petroleum, which is roughly similar per gallon for other petroleum products).[12] A kWh of electrical energy is equivalent to 3,412 BTUs, but to generate electricity and transmit it to the point where it is used consumes additional energy. Generation efficiency is approximately 35 percent in modern power plants and transmission losses amount to approximately five percent. Including these energy requirements, the total energy equivalent of one kWh consumed is 10,260 BTUs.

Energy consumed for operations is typically referred to as direct energy. Energy consumed in construction and maintenance is referred to as indirect energy. Over the life of a transportation system, direct energy consumption is usually the largest component of total system energy. Vehicle propulsion energy can amount to 60 percent of total system energy.[13]

From an energy conservation standpoint, therefore, direct energy impacts are of more importance than indirect energy impacts. Although the CalTrain Downtown Extension project involves construction activity, and consequently substantial indirect energy impacts, the differences in energy impacts between the No-Build and Build Alternatives are not considered as meaningful as the differences in energy impacts of the different propulsion modes. For these reasons, this energy analysis focuses on direct rather than indirect energy requirements and compares the potential efficiency benefits of alternative propulsion modes.

5.18.2 Energy Consumption from Train Operations

Diesel locomotives currently operate on all trains to Fourth and Townsend. Diesel-fueled engines turn electric generators for powering drive motors. With the downtown extension, diesel operation in the tunnel segments would not be practical due to the release of diesel exhaust pollutants, and alternative energy propulsion would be needed. Three locomotive propulsion options are being considered for the CalTrain Extension: (1) dual-mode operation with electric trailer units, (2) dual-mode, new diesel/electric locomotives, and (3) full system electrification.

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[12] *Energy and Transportation Systems*, Caltrans, Division of Engineering Services, July 1983.

[13] *Energy and Transportation Systems*

Direct energy requirements are assessed in terms of the total energy consumed annually for the No-Build Alternative and the three CalTrain Extension propulsion options. Differences in alignments and profiles for the extension options would not result in substantial differences in total energy consumed. Total energy is expressed in terms of BTUS. Energy consumption is estimated from industry data and generic simulations of fuel consumption for diesel and electric locomotives, adjusted to reflect conditions in the CalTrain corridor.

Table 5.18-1 summarizes the direct energy consumption impacts for the propulsion options for 60-train and 86-train schedules in 2010 with and without the CalTrain Extension. Since train passenger capacity is assumed to be the same for each propulsion type, total energy per seat-mile or similar measure is directly proportional to total energy per train mile.

Total annual energy consumption is estimated to be highest under full electrification of CalTrain service. Dual-mode operation with electric trailer units or with new diesel/electric locomotives would consume slightly less energy.

A portion of the increase in energy consumption for the Build Alternative compared to the No-Build Alternative is attributable to a projected increase (approximately three percent) in annual miles of train operation. Overall, differences in total annual energy consumption for Build Alternative propulsion options are not substantial, with, at most, a five percent increase over the No-Build Alternative.

5.18.3 Mitigation Measures

No mitigation of the energy consumption requirements of project alternatives is necessary.

5.19 TRANSIT, TRAFFIC AND PARKING

Current transportation setting and projected No-Build conditions as well as projected CalTrain ridership and travel times for the CalTrain Extension Alternative are described in Chapter 3. All other transportation effects of extending CalTrain to the Transbay Terminal Site are presented in this section.

Table 5.18-1
Direct Energy Consumption for Optional Propulsion Modes by Alternative

Alternative	Propulsion Energy per Train Mile [1]	Total Energy in Btus per Train Mile	60 Trains per Day		86 Trains per Day	
			Annual Revenue Train Miles [2]	Annual Energy Consumption in Millions of Btus [3]	Annual Revenue Train Miles [4]	Annual Energy Consumption in Millions of Btus [3]
No-Build Alternative -- Diesel	2.2 gallons	324,720	938,000	304,587	1,344,529	436,596
Build Alternative -- Propulsion Options						
☐ Dual-mode operation with electric trailer units						
Diesel	2.2 gal.	324,720	938,000	304,587	1,344,529	436,598
Electric trailer units	32 kWh	329,600	26,000	8,570	37,268	12,284
		Total	964,000	313,157	1,381,798	448,879
☐ Dual-mode, new diesel/electric locomotives						
Diesel	2.2 gal.	324,720	938,000	304,587	1,344,529	436,598
Electric trailer units	32 kWh	329,600	26,000	8,570	37,268	12,284
		Total	964,000	313,157	1,381,798	448,879
☐ Full system electrification.	32 kWh	329,600	964,000	317,734	1,381,798	455,440

Notes:

[1] Total energy accounts for energy required to refine diesel and to generate (coal or petroleum fuels) and transmit electricity.

[2] Based on 60 one-way train trips for weekday service and 45 one-way trips for weekend service (Saturdays, Sundays combined). Average all-day consist size is four passenger cars and one locomotive. Train miles for build options include increase in deadheading to midday terminal.

[3] Energy use by mode assumes diesel locomotive is advanced diesel, 5,200 HP with four x-2000 coaches; electric locomotive is based on AEM-7 with same consist size and coach type.

[4] Based on 86 one-way train trips for weekday service and 65 one-way trips for weekend service (Saturdays, Sundays combined). Average all-day consist size is four passenger cars and one locomotive. Train miles for build options include increase in deadheading to midday terminal.

Source: *Energy and Transportation Systems*, Caltrans, Division of Engineering Services, 1983; *Commercial Feasibility Study: Energy and Emissions Methodology*, Argonne National Laboratory, Center for Transportation Research, 1995; De Leuw, Cather & Co.

5.19.1 Impacts on Corridor Transit Patronage

As indicated by Table 5.19-1, the CalTrain Extension Alternative would increase linked transit trips in the corridor in the year 2010 from about 662,000 to 667,000 trips per day, an increase of 5,000 trips per day. As defined for this project, a linked transit trip consists of two or more unlinked trips, i.e., transit trips that involve two or more vehicles or modes. Thus an increase in linked transit trips in the corridor indicates that more people are choosing to use CalTrain instead of non-transit modes, compared with the No-Build Alternative.

Table 5.19-1
Total Corridor Transit Linked Trips per Day

County From/To	San Francisco	San Mateo	Santa Clara	Total
1990				
San Francisco	421,005	7,085	962	429,052
San Mateo	31,018	19,955	2,702	53,675
Santa Clara	3,079	2,383	73,673	79,135
Total	**455,102**	**29,423**	**77,337**	**561,862**
No-Build Alternative (2010)				
San Francisco	474,321	10,588	1,769	486,678
San Mateo	45,530	27,086	3,636	76,252
Santa Clara	6,381	2,988	89,862	99,231
Total	**526,232**	**40,662**	**95,267**	**662,161**
CalTrain Terminal Extension Alternative (2010)				
San Francisco	474,336	10,654	1,877	486,867
San Mateo	48,467	27,027	3,663	79,157
Santa Clara	7,783	3,073	90,053	100,909
Total	**530,586**	**40,754**	**95,593**	**666,933**

Source: Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996

Travel by transit as a percentage of total travel by all modes (transit mode share) in the corridor is another important measure of overall transit patronage to compare the effect of the CalTrain Extension. Comparisons of the 1990 and 2010 transit mode share by alternative for total work trips are presented in Table 5.19-2. Because transit trips within San Francisco dominate corridor transit statistics, only small increases in the overall transit mode share for total transit trips within San Francisco are projected between the No-Build and the CalTrain Extension Alternatives.

Table 5.19-2
Corridor Transit Mode Share (for Work Trips)

County From/To	San Francisco	San Mateo	Santa Clara	Total
1990				
San Francisco	29.46%	4.50%	4.11%	26.66%
San Mateo	15.05%	1.38%	1.62%	2.96%
Santa Clara	12.80%	1.90%	1.74%	1.80%
Total	**27.43%**	**1.70%**	**1.74%**	**7.19%**
No-Build Alternative (2010)				
San Francisco	28.53%	6.10%	7.59%	26.17%
San Mateo	19.18%	1.59%	1.99%	3.60%
Santa Clara	21.80%	2.11%	1.69%	1.8[illegible]%
Total	**27.28%**	**2.02%**	**1.73%**	**7.00%**
CalTrain Terminal Extension Alternative (2010)				
San Francisco	28.53%	6.13%	8.06%	26.18%
San Mateo	20.42%	1.59%	2.01%	3.74%
Santa Clara	26.59%	2.17%	1.70%	1.84%
Total	**27.50%**	**2.02%**	**1.73%**	**7.05%**

Source: Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996

Increases in transit mode shares are also projected, however, for trips made from San Mateo and Santa Clara counties to San Francisco for the CalTrain Extension Alternative. Santa Clara County would have the largest increase in transit mode share with the CalTrain Extension Alternative, with overall transit trips to San Francisco projected to rise from about 22 to 27 percent of all trips in 2010. Overall transit trips to San Francisco from San Mateo County are projected to rise from 19 to 20 percent of all trips in 2010.

5.19.2 Impacts on Other Transit Services

The CalTrain Extension would provide a terminus that is much closer to downtown San Francisco and the Financial District than at present. Current bus shuttles between these areas and the existing CalTrain terminus at Fourth and Townsend streets would be eliminated or rerouted, with possible corresponding reductions in Muni's operating costs. With the extension, CalTrain would also provide better service to downtown San Francisco for some trip makers than would BART and SamTrans, with attendant patronage impacts on these systems.

The CalTrain Extension would also have long-term impacts on transit services that currently utilize the Transbay Terminal. Demolition of the Transbay Terminal could have a major impact on these transit operations unless a new facility were built nearby to replace the existing terminal.

Operators serving the facility would lose this transit hub as a connection point between the various operators and as a terminus for many routes. These potential impacts are discussed in the following subsections. Construction of a new bus terminal that would mitigate these transit impacts is discussed and evaluated in Chapter 6.

BART

Ridership forecasts predict that the CalTrain Extension Alternative would result in a 16 percent reduction in BART entries and exits in San Mateo County (at the Daly City, Colma, Hickey, Tanforan, SFO, and Millbrae BART stations). Table 5.19-3 indicates that in 2010 there would be about 11,400 daily transfers between BART and CalTrain at the proposed Peninsula intermodal transfer facility in Millbrae under the No-Build Alternative, and that this number would drop by more than 8,600 (75 percent) if CalTrain were extended into downtown San Francisco. An additional 1,400 transfers per day between BART and CalTrain is projected to occur in downtown San Francisco under the CalTrain Extension Alternative.

Table 5.19-3
Projected Daily Transit Transfers in 2010

Location/ Alternative	Home-based Work Transfers Between:			Non-Work Transfers Between:		
	BART & CalTrain	BART & Bus/LRT	CalTrain & Bus/LRT	BART & CalTrain	BART & Bus/LRT	CalTrain & Bus/LRT
Peninsula Intermodal Facility at Millbrae						
No-Build	8,050	5,735	820	3,347	1,095	216
CalTrain Extension	2,236	5,006	873	324	845	235
Downtown San Francisco						
No-Build	0	8,185	2,319	0.00	6,144	1,081
CalTrain Extension	1,001	8,215	2,282	395	5,962	1,418

Source: MTC 1994 RTP Model Results

MUNI

The following assumptions about Muni bus route changes with the CalTrain Extension Alternative were made:

- The 30-Stockton would be truncated and rerouted along Mission Street.
- The 42-Downtown Loop would be rerouted to run along Harrison Street and Bryant Street between Fifth Street and Main Street.
- The 76-Marin Headlands and the 82X-Levi Plaza Express would be truncated and rerouted to serve the Transbay Terminal area.

The changes in Muni service are predicted to result in a reduction in annual revenue-hours and revenue-miles for Muni of 15,700 hours and 151,100 miles, respectively, resulting in an annual cost savings of about $1.4 million. Muni would also reduce its peak fleet demand by four buses. In addition to re-routing existing Muni service to CalTrain's Fourth and Townsend Streets terminal, the existing Muni shuttle service (81x, 80x) to the CalTrain terminal could be eliminated saving the JPB approximately $558,000 for Muni shuttle service savings per year. There also would be a reduction in Muni Metro LRT service to Fourth and Townsend, resulting in a further reduction in Muni's operating costs.

The CalTrain Extension Alternative could also have an impact on the design and right-of-way of the Muni Metro East yard facility. If the CalTrain storage yard is located at Sixteenth and Owens Streets, the proposed Muni Metro East yard access tracks would be shifted about 140 feet eastward and some redesign of the Metro East yard would be needed.

SamTrans

The extension of CalTrain would also decrease the need for SamTrans express bus service from the Peninsula to the Transbay Terminal. SamTrans express routes including the 16F, 17F, 18F, 19F, 47F, 48F and 49F would likely be eliminated. Consequently, the extension of CalTrain into downtown is projected to result in a 10 percent reduction in SamTrans bus ridership where a SamTrans bus was the primary mode of travel. Trips that use a SamTrans bus to gain access to a CalTrain or BART station are not included in this estimate. Additionally, local SamTrans routes would continue to serve downtown San Francisco in the Terminal area.

This reduction in service would decrease SamTrans annual revenue-hours and revenue-miles by 16,500 hours and 405,200 miles, respectively. SamTrans would also require 32 fewer buses during the peak periods of operation. This would result in a $2.6 million reduction in annual operating and maintenance costs for SamTrans.

AC Transit

With demolition of the Transbay Terminal and terminal loop ramp, AC Transit would lose its direct grade-separated connection to its downtown San Francisco bus terminal, making necessary the use of the First Street or Fremont Street ramps that lead to the surface street system. In the absence of a functionally equivalent replacement bus terminal, this surface street operation would have substantial operating cost impacts to AC Transit due to increased travel times. (See Chapter 6 for a discussion of mitigation options for the Transbay Terminal.) If mitigation could be applied to avoid this impact on AC Transit operations, extending CalTrain to a terminal used by AC Transit would encourage transfers from CalTrain to AC Transit buses, thereby increasing AC Transit bus ridership.

Golden Gate Transit

With demolition of the Transbay Terminal, Golden Gate Transit would lose a layover point for their basic service routes. These four bus layover spaces could be relocated to the surface lot that Golden Gate currently uses, but given that Golden Gate leases this lot and that the lease could terminate, midday layover area for these basic routes may need to be provided on-street or in another surface lot area.

Demolition of the Transbay Terminal and provision of a replacement bus terminal (as discussed in Chapter 6) would require relocation of some Golden Gate bus stops and changes to some bus routes to serve the CalTrain and new bus terminal, but such changes are deemed to be minor. Current assumptions regarding Golden Gate Transit service changes are provided in Chapter 6, Section 6.3.

The increased proximity of the CalTrain terminal to Golden Gate Transit bus routes could increase the number of transfers from CalTrain to Golden Gate buses, thereby increasing Golden Gate bus ridership, assuming that a suitable replacement bus terminal is constructed.

Other Transit Operators

Greyhound and other operators currently using the Transbay Terminal would need to relocate their operations.

5.19.3 Impacts on Vehicular Traffic

Travel Time Impacts in CalTrain Corridor

Projected travel times for representative trips by auto within the corridor are shown in Table 5.19-4. Auto trips were assessed for three categories: drive alone, shared ride-two persons, and shared ride-three or more persons. HOV lanes are expected to be more prevalent in 2010, with an overall effect on travel times. Table 5.19-4 shows that the CalTrain Extension would have a beneficial impact on traffic congestion. In every case, auto travel times in the am peak period are expected to decrease under the CalTrain Extension Alternative.

Table 5.19-4
AM Highway Travel Times for Selected Trips (minutes)

Trip Segment	1990 Time	No-Build Alternative Time (2010)	CalTrain Extension Alternative Time (2010)	Travel Time Improvement with Extension Alternative
San Jose to San Francisco				
Drive Alone	61	63	62	8%
2 - Person or 3 - Person	57	58	56	3%
Sunnyvale to San Francisco				
Drive Alone	48	52	48	6%
2 - Person or 3 - Person	48	59	48	8%
San Mateo to San Francisco				
Drive Alone	27	29	25	14%
2 - Person or 3 - Person	27	29	25	14%
Burlingame to San Francisco				
Drive Alone	24	24	22	8%
2 - Person or 3 - Person	24	29	22	6%
San Bruno to San Francisco				
Drive Alone	22	19	18	5%
2 - Person or 3 - Person	22	48	18	5%
San Francisco to San Francisco Airport Terminal				
Drive Alone	16	17	18	6%
2 - Person or 3 - Person	16	17	18	6%
North Beach to San Francisco Airport Terminal				
Drive Alone	19	20	18	10%
2 - Person or 3 - Person	19	20	18	10%
Palo Alto to Berkeley				
Drive Alone	48	59	48	14%
2 - Person or 3 - Person	48	48	47	2%
Oakland to San Carlos				
Drive Alone	48	59	49	10%
2 - Person	44	54	48	11%
3 - Person	41	39	37	5%
Average Improvement in Travel Time				**12%**

Source: Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996.

Relocating CalTrain's San Francisco terminus to the Transbay Terminal area is expected to result in a seven percent reduction in the number of person hours of vehicle travel.[14] Morning peak hour delay is expected to be reduced by 20 percent.

Implementation of the CalTrain Extension would result in daily travel time savings of 4,400 person hours, which includes 2,900 person hours saved for CalTrain riders and 1,500 person hours for roadway travelers in the corridor. Using FTA procedures, this represents an approximate $12 million per year savings (4,400 hours/day X $11.26/hour X 250 work days/year).

Vehicle Miles Traveled (VMT) Impacts in the CalTrain Corridor

Year 2010 AM peak-hour vehicle miles traveled (VMT) on all roadways in the corridor is projected to decrease by 1.3 percent from 11,421,000 to 11,276,000 VMT, a peak-hour savings of 145,000 VMT with the CalTrain Extension Alternative compared with the No-Build Alternative.

There would be additional travel time and VMT impacts in downtown San Francisco as a result of bus terminal mitigation options. These impacts are evaluated in Section 6.4.

5.19.4 Impacts on Parking

A reduction in the supply of parking would occur as a result of the new underground CalTrain terminal at the Transbay Terminal site. A portion of the existing public and private parking facilities (parking lots and garages) in or near the Transbay Terminal would be removed, at least temporarily, to construct the new underground CalTrain terminal. The location of parking areas in the vicinity of the project is shown in Figure 5.2-1. As a result of the CalTrain Extension Alternative, approximately 900 parking spaces would be displaced, including 260 spaces within the current Transbay Terminal building. The remaining approximately 640 spaces, located generally under the current Transbay Terminal west bus ramps, potentially could be placed back in their current locations following construction of the CalTrain Extension Alternative. (Additional parking displacement would occur as a result of bus terminal mitigation options -- see Section 6.5.)

With the loss of parking, vehicles previously bound for the displaced parking spaces would have to park in other parking facilities nearby. Based on a review of a recent parking inventory, the current study area parking supply is at approximately 85 percent capacity during the weekday midday. As a result of the reduction in parking spaces, usage could reach well over 90 percent of capacity during the weekday midday. Given the first-in first-served nature of parking, with early morning commuters able to park closer to their destination, loss of area parking would mean that vehicles arriving later would have to park further away from their destinations. The loss of parking could also deter additional commuters from driving, with a probable increase in public transit use.

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[14] August 27, 1996 memo from Korve Engineering to ICF Kaiser Engineers.

San Francisco has a "transit first" policy, and the displacement of automobile parking spaces is generally not considered an impact requiring direct mitigation. Potential economic and fiscal impacts of parking displacements are reported in Section 5.6.

5.19.5 Impacts on Pedestrians/Non-Motorized Traffic

Under existing conditions, approximately 85 percent of the trips which exit CalTrain at Fourth and Townsend streets continue to their destination via another transit mode. Currently, the total daily access and egress from the Fourth and Townsend station is approximately 11,300 trips, or about 5,650 in the AM peak and 5,650 in the PM peak. With the extension of CalTrain to a downtown terminal, the majority of the trips through the Fourth and Townsend area would continue to the new terminus. If the station currently operating at Fourth and Townsend were to be replaced by a new Mission Bay station at Fifth and Townsend, total daily access and egress from the new Mission Bay station is projected to be approximately 3,600.[15] Pedestrian traffic in the area surrounding the existing station would therefore be greatly reduced. This would result in improved pedestrian conditions at the study intersections of King and Townsend and Fourth and Townsend.

Intersections surrounding the new CalTrain downtown terminal would have an increase in pedestrian traffic. During the 2010 AM peak hour, the maximum number of trips into and out of the terminal is estimated to be 2,670, with a Mission Bay station, and 3,045, without a Mission Bay Station.

5.19.6 Mitigation Measures

No mitigation measures are proposed for transit, highway, and non-motorized impacts beyond the replacement of the Transbay Terminal, the options for which are discussed in Chapter 6.

5.20 CONSTRUCTION STAGING AND METHODS

Project construction activities would occur with the CalTrain Extension Alternative and would not occur for the No-Build Alternative. Even though project construction activity would be relatively short-term and geographically limited, potential construction impacts were an important factor in the selection of the proposed CalTrain alignment. Alignments that would have passed directly through residential areas (e.g., the South Beach residential area) were rejected (see Section 2.6), and portions of the proposed alignment near residential areas are now proposed to be constructed underground in tunnel rather than using cut-and-cover techniques.

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[15] Ridership Forecasting Results Report, Korve Engineering, Inc., May 29, 1996.

Since construction impacts of the project are of concern to the community, this section describes the proposed construction process and methods. Section 5.21 describes potential impacts of construction and Section 5.22 describes mitigation measures.

This section divides the construction process into several steps based upon the type of construction and when it would occur. Section 5.20-1 summarizes preconstruction activities. Section 5.20-2 summarizes construction activities.

5.20.1 Pre-construction Activities

This section outlines preconstruction activities. A summary of preconstruction activities is provided in Table 5.20-1.

Table 5.20-1
Pre-construction Activities -- CalTrain Extension

- ☐ Prepare Final Design and Construction Contracts
- ☐ Prepare Vehicular and Pedestrian Traffic Control/Detour Plans
- ☐ Undertake Building Data Survey
- ☐ Undertake Detailed Geotechnical Investigation
- ☐ Undertake Pre-Construction Business Survey
- ☐ Establish Construction-related Community Information / Outreach Program
- ☐ Acquire Property and Easements:
  - ○ Easements involve specific parcels along: Seventh, Townsend, Second, Colin P. Kelly, Brannan, DeBoom, Federal Way, Bryant, Tehama, Howard, and Natoma
  - ○ Full acquisitions include properties along Brannan St, Howard, Natoma, Tehama, Beale, and Owens Streets and the existing Transbay Terminal Site

Final Design and Development of Construction Contracts

During final design, detailed design elements of the CalTrain Extension would be developed, reflecting, among other subjects, final geotechnical investigations. As part of the final design, JPB would work with property owners planning to build new structures adjacent to the proposed CalTrain alignment to integrate construction of the CalTrain project with construction of the private structures in order to reduce CalTrain construction impacts. Final design would in turn lead to determinations of contract packaging. Different contracts are likely to be let to construct different portions of the extension, e.g., separate contracts likely would be let to construct the underground CalTrain terminal, the mined tunnel section, the cut-and-cover sections, utility relocation, and building demolition.

Vehicular and Pedestrian Traffic Plans

Construction of the CalTrain Extension would temporarily interfere with the normal flow of traffic, causing some lanes and streets to be closed to vehicles for various durations. Some streets would be subject to lane and night closures as summarized in Table 5.20-2. During final design, street traffic control plans would be developed in cooperation with the Caltrans, the City/County of San Francisco (DPT, police and fire departments, and Muni) to accommodate required pedestrian and traffic movements. To the extent practical, traffic lanes would be maintained in both directions, particularly during peak traffic hours.

Table 5.20-2
Temporary Lane and Night Street Closures During Construction

- ☐ All but one lane of Townsend Street, between Seventh and Fourth Streets would be closed during construction of the surface and retained cut portion of the Townsend Street Center Option. Traffic lanes would not be closed for this section of Townsend for the Townsend South Options.
- ☐ The Townsend at Fourth Street intersection would experience lane closures during construction of the cut-and-cover portion of the extension (under all options) until the street deck is placed over the construction. The objective would be to maintain at least two lanes of traffic on Fourth Street during construction. Placement of the deck would allow for traffic to again operate on the street.
- ☐ All but one lane of Townsend Street between Third and Fourth Streets would be closed for up to 18 months during construction of the cut-and-cover portion of the extension. Once a deck is placed over the cut-and-cover construction, traffic could make use of the street, although excavation and additional construction would still occur along portions of the constructed deck.
- ☐ A portion of Howard Street east of Second Street (i.e., the portion generally under the current bus ramps) would be subject to closure during construction of the cut-and-cover portion of the extension north of Folsom Street. At least two lanes of traffic would be maintained during construction. Completion of the deck over the cut-and-cover construction would allow for all lanes of traffic to operate.
- ☐ A portion of Clementina Street and a portion of Tehama Street east of Second Street (i.e., the portion generally under the current bus ramps) would be subject to closure during construction of the cut-and-cover portion of the extension north of Folsom Street. At least one lane of traffic would remain open at all times. Completion of the deck over the cut-and-cover construction would allow for traffic to use the full street.
- ☐ A portion of Natoma Street east of Second Street (i.e., the portion generally under the current bus ramps) would be closed during the entire construction period of the underground CalTrain Station (approx. two years). At least one lane of traffic would be provided from First Street west to the construction site and from Second Street east to the construction site to provide access to businesses along Natoma Street.
- ☐ A portion of Minna Street (generally adjoining the current Transbay Terminal) would be closed during the entire construction period of the underground CalTrain Station (approx. two years). One lane would remain open from First Street to Shaw Street to allow access to businesses along Minna Street. The full street would remain open from Shaw Street west to Second Street.
- ☐ First Street between Natoma and Minna Streets could be closed during late evening hours to construct a deck under which construction of the underground CalTrain station would occur. At least three lanes of traffic would be maintained during the day.
- ☐ Fremont Street between Natoma and Minna Streets would be closed during late evening hours to construct a deck under which construction of the underground CalTrain station would occur. At least three lanes of traffic would be maintained during the day.
- ☐ Beale Street in the section directly east of the current Transbay Terminal would be closed during late evening hours to construct a deck under which construction of the underground CalTrain station would occur. At least two lanes of traffic would be maintained during the day. Beale Street north of this section would be subject to closure during construction of the optional underground pedestrian walkway between the Transbay Terminal and the Embarcadero Muni/BART Station.

Building Data Survey

A pre-construction structural survey would be completed to determine the integrity of existing buildings adjacent to and over the proposed extension. This survey would be used to finalize detailed construction techniques along the alignment and as the baseline for monitoring construction impacts during and following construction. During construction, the JPB would monitor adjacent buildings for movement and, if movement is detected, take immediate action to control the movement.

Detailed Geotechnical Investigation

During final design, additional sampling and analyses of subsoil conditions would be used to detail and finalize the excavation and tunnel support system to be used in the retained cut, cut-and-cover, and mined tunnel portions of the extension. Additional geotechnical surveys (drilling, core samples) would be conducted as part of this effort. Current data, including subsurface sampling conducted for this study, have been used to identify the proposed construction techniques presented in the following sections, which form the basis for the impact analysis that follows in Section 5.21.

Pre-Construction Business Survey

Prior to construction, the JPB would contact and interview individual businesses along the alignment to gather information and develop an understanding of how these businesses carry out their work. This survey would identify business usage, delivery/shipping patterns, and critical times of the day or year for business activities. The survey would assist in: (a) the identification of possible techniques during construction to maintain critical business activities, (b) the analysis of alternative access routes for customers and deliveries to these businesses, (c) the development of traffic control and detour plans, and (d) the final determination of construction practices.

Establishment of Construction Community Information/Outreach Program

A community construction coordination program would be established to provide on-going dialogue between the JPB and the affected community regarding construction impacts and possible mitigation/solutions. The program would include dedicated personnel, including an outreach office in the construction area, to deal with construction coordination. An important element of this program would be the dissemination of information in a timely manner regarding anticipated construction activities.

Land and Easement Acquisition

Properties would need to be acquired prior to construction of the project. In addition, property easements would be obtained for those properties above the proposed tunnel portion. See

Section 5.2 for a complete discussion of these acquisitions, including a review of relocation assistance that would be provided.

5.20.2 Construction Activities

Types, location, and lengths of construction activities that would occur under the CalTrain Extension Alternative are provided in Table 5.20-3 and are discussed below.

Underground Utility Relocation

Subject to other constraints, the CalTrain extension has been located to avoid to the extent possible conflicts with the space occupied by major utilities. In certain instances, the positioning of the alignment, station, and ancillary facilities would require that conflicting utilities be relocated. Relocation of utilities to a new permanent location so that they would not be affected by alignment or station construction would generally be performed prior to construction of the extension. Construction equipment typically required for utility relocation and restoration includes: excavator/backhoes, trenchers, trucks, and generator/compressors. Cement trucks, pavers, rollers, and power compactors are typically required for street restoration.

Utilities, such as high-pressure water mains and gas lines, that are not to be permanently relocated away from the work site, would be temporarily removed from the construction area. For these relocations, no or very brief disruption (less than a day) could occur to utility service. The utilities would be relocated temporarily at the early stages of construction and reset in essentially their original locations during the final backfilling above the construction.

Utilities within the subsurface construction area that do not need to be relocated, either permanently or temporarily, would be uncovered during the early stages of excavation. These buried utilities, with the possible exception of sewers, are generally found within several feet of the street surface. They would be reinforced, if necessary, and supported by hanging from deck beams.

Building Demolition

The CalTrain extension alignment has been selected to minimize, to the extent possible, impacts on adjoining buildings and on the communities through which it passes. Still, some properties would have to be acquired and the structures on these properties demolished. Given its size, the Transbay Terminal building would be the most difficult and time-consuming of the buildings to be demolished. Demolition of the Terminal is likely to involve the most impacts on the community, particularly given its proximity to other buildings and to Minna and Natoma Streets and the fact that it is built over Fremont and First Streets -- two heavily utilized streets. Equipment typically involved in demolition includes: crawler cranes, crawler dozer/loaders, pavement breakers, rubber-tired loader/bob cats, trucks, excavator/backhoes, generator/compressors, and water trucks for dust control.

Table 5.20-3
CalTrain Extension Construction Activities

CONSTRUCTION ACTIVITIES	LOCATION	LENGTH IN FEET
Relocate Utility Lines	See Section 5.12	N / A
Demolish Buildings	As required along Brannan, Howard, Beale, and Owens Streets and the existing Transbay Terminal Building, and north platforms and maintenance buildings at current CalTrain Station and yard.	N / A
Demolish Bus Ramps	Transbay Terminal west bus ramp from Folsom St. north to current west bus exit from Transbay Terminal	1,060
Construct Bus Mitigation	Needed for replacement of current Transbay Bus Terminal functions. See Chapter 6 of this DEIS/DEIR	N / A
Construct New Surface Rail Line	**Townsend St. Center Alignment Option:** From under I-280 east of 7th St. to middle of Townsend St. between 5th & 7th Sts	2,350
	Townsend St. South Side Alignment Option: From under I-280 east of 7th St. to south of Townsend St. between 5th & 7th Sts.	
Construct New Surface Rail Station	**Townsend St. Center Alignment Option:** Middle of Townsend St. between 5th & 6th Sts.	680
	Townsend St. South Side Alignment Option: South of Townsend St. between 5th & 6th Sts.	
Construct Midday Storage Yard	North of 16th St. west of Owens under & to the east of I-280	8 tracks -- 1,000 ft. each
	or South of Townsend St. between 5th & 7th Sts.	
Construct Retained-cut Section & Portal	**Townsend St. Center Alignment Option:** On Townsend St. between 4th & 5th Sts. with portal just west of 4th St.	660
	Townsend St. South Side Alignment Option: South of Townsend St. between 4th & 5th Sts. with portal just west of 4th St.	
	Townsend St. South/Subway Alignment Option: East of and parallel to 7th St. between Irwin St. & south of Berry St. with portal just south of Berry St.	700
Construct Cut-and-cover Section	**Townsend St. Center and South Side Alignment Options:** In Townsend St. between just west of 4th St. to just west of 3rd St.	965
	Townsend St. South/Subway Alignment Option: Parallel and just east of 7th St. curving to south side of Townsend St. (parking and traffic lanes) east to just west of 3rd St.	3,950
	All Options: Under the alignment of current Transbay Terminal west bus ramps from just north of Folsom St. north to Transbay Terminal Site	990

Table 5.20-3, continued
CalTrain Extension Construction Activities

CONSTRUCTION ACTIVITIES	LOCATION		LENGTH IN FEET
Construct Mined Tunnel	From just west of 3rd Street on Townsend curving north under Rincon Hill to just north of Folsom Street under current Transbay Terminal west bus ramps	Short-radius	3,900
		Medium-radius	3,725
		Long-radius	3,540
Construct New Underground Rail Station	Under site of current Transbay Terminal and under Beale Street up to the 201 Mission Street Building		1,035
Reconstruct Streets	Townsend St. where cut-and-cover construction occurs; Howard, Clementina, and Tehama Sts. east of 2nd St.; and 1st, Fremont and Beale Sts. over new Train Station	Townsend St. - Center Alignment Option	3,500
		Townsend St. - South Side Alignment Option	1,400
		Townsend St. - South/Subway Alignment Option	3,900

Bus Ramp Demolition

Construction of the cut-and-cover portion of the CalTrain extension north of Folsom Street would require demolition of the existing bus ramps leading from the current western exit of the Transbay Terminal. Equipment involved in demolition of the bus ramps would likely include: crawler dozer/loaders, crawler cranes, pavement breakers, rubber-tired loader/bob cats, trucks, excavator/backhoes, generator/ compressors, and water trucks for dust control.

Surface Rail Line and Station Construction

All Townsend Street Alignment Options would require removal of the northern two to four tracks, one platform, and two maintenance buildings at the current CalTrain Terminal Station and yard at Fourth and Townsend Streets. For the Townsend-Street Center and South Side Alignment options, the CalTrain mainline tracks would be placed on the surface immediately east of Seventh Street and curve east to either the center of a reconstructed Townsend Street or to the south of existing Townsend Street.

Equipment used for removal of existing rail and construction of new mainline track include: crawler dozer/loaders, surface graders, rubber-tired loaders/bob cats, trucks, concrete trucks, railroad track-laying equipment, rail welding machines, and water trucks for dust control. The Townsend Street-Center Alignment Option also would entail demolition of a portion of Townsend Street (involving such equipment as crawler dozer/loaders, pavement breakers, rubber-tired loader/bob cats, trucks, excavator/ backhoes, and generator/compressors) and the subsequent reconstruction of Townsend Street (involving such additional equipment as compactors, rollers, concrete trucks, and asphalt paving machines).

The Townsend-Center and Townsend-South Side options would provide for a CalTrain surface station to be constructed either in the center of a reconstructed Townsend Street or to the south of the existing Townsend Street. Equipment typically used for surface construction includes: crawler dozer/loaders, excavator/backhoes, concrete trucks, pavement breakers, small cranes, delivery trucks, and generator/compressors.

Midday Storage Yard Construction

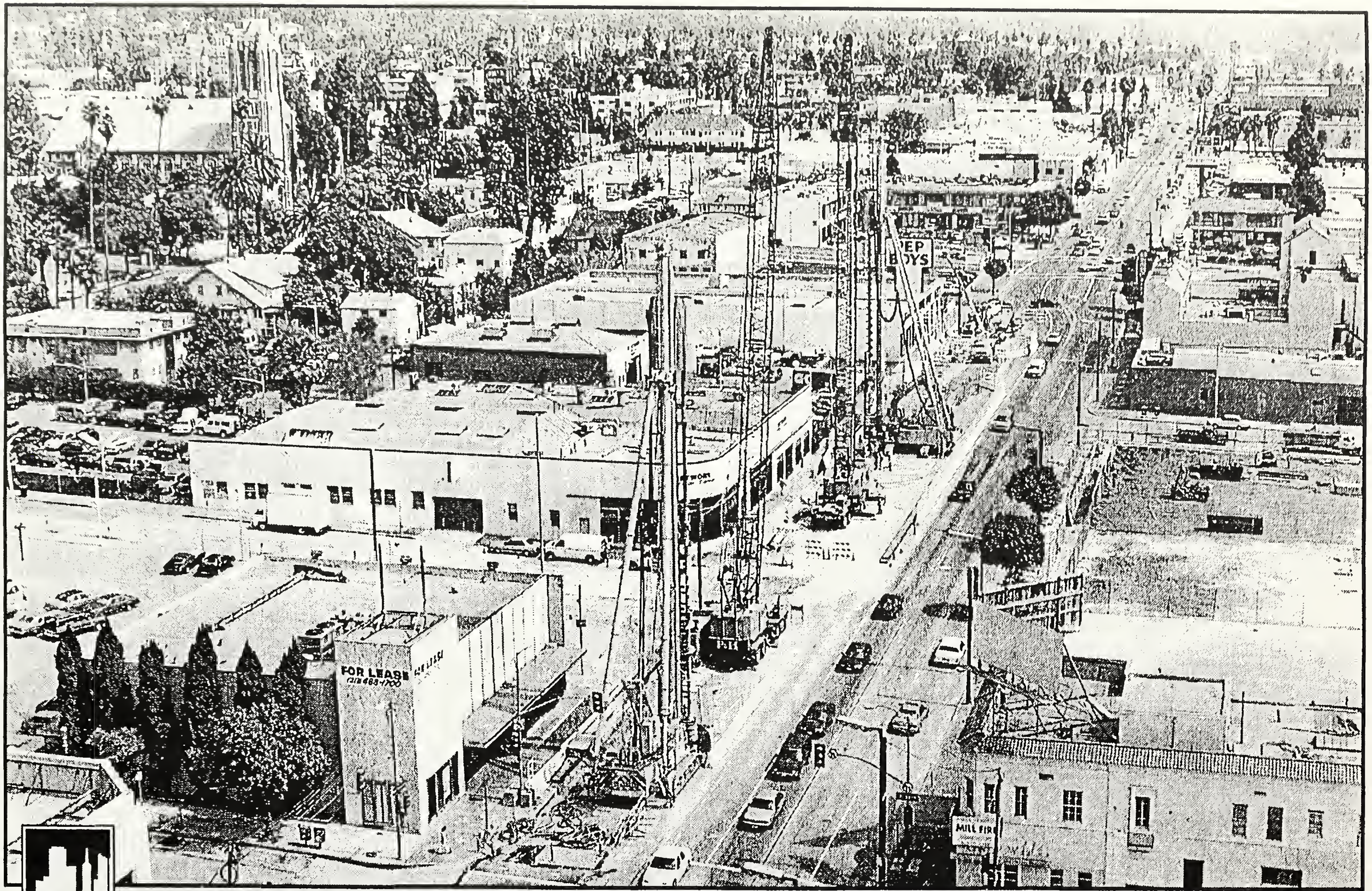
Construction of the 16th and Owens Street midday storage yard could occur immediately following acquisition of the subject property and demolition of the existing warehouse. Construction of the Townsend and Seventh Street midday storage yard could occur as part of the existing terminal reconfiguration to allow construction of the Townsend Segment or as an initial stage of the project. Some midday train storage may need to occur in San Jose until completion of this storage yard option.

Construction of either midday storage yard would involve site preparation (e.g., demolition of the current truck access/loading surface area, surface grading), and the placement of track and overhead electrical wire. Connections (switches) from either yard to the mainline track would occur during CalTrain's non-operating hours.

Equipment for yard construction would include: concrete trucks, pavement breaker, small cranes, compactors, rollers, welders, trucks, generator/compressors, crawler dozer/loader, and water trucks for dust control.

Retained-Cut Section and Portal Construction

The CalTrain alignment would transition from surface to subsurface in the retained cut (open trench) portion of the alignment. Due to the nature of the geology and groundwater in the retained cut portion of the extension, in-situ soil-cement walls are proposed for construction of excavation side walls. Soil-cement walls (or soil mix walls) would be constructed in the ground without excavating and replacing existing soils. Rather, soils are mixed in-situ (in place) with cement grout, forming a row of overlapping soil-cement columns that create a wall. A specialized auger (Figure 5.20-1) is used in this process.


FOR LEASE
PEP BOYS
MILL FIR

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SOIL CEMENT WALL AUGERS IN USE

FIGURE 5.20-1

Figure 5.20-2 shows the sequence for drilling of the auger holes and creation of the wall. The contractor would first occupy one side of the alignment to install one line of soil-cement columns and then move to the opposite side. As shown in Figure 5.20-2, large vertical steel beams (called soldier piles) would be placed in the columns at regular intervals for additional wall support.

This construction technique involves some displacement of soil (25-30 percent), which bubbles out of the auger hole onto the surface. This soil, which is mixed with the cement, would be left to harden and then be removed by truck.

The in-situ soil-cement walls can be used not only for soil stabilization and excavation support but also for groundwater cutoff, a critical concern in areas exhibiting high ground water levels. For the proposed CalTrain extension, underground segments that are in fill -- portions that previously were part of the San Francisco Bay and were later filled -- exhibit high water tables.

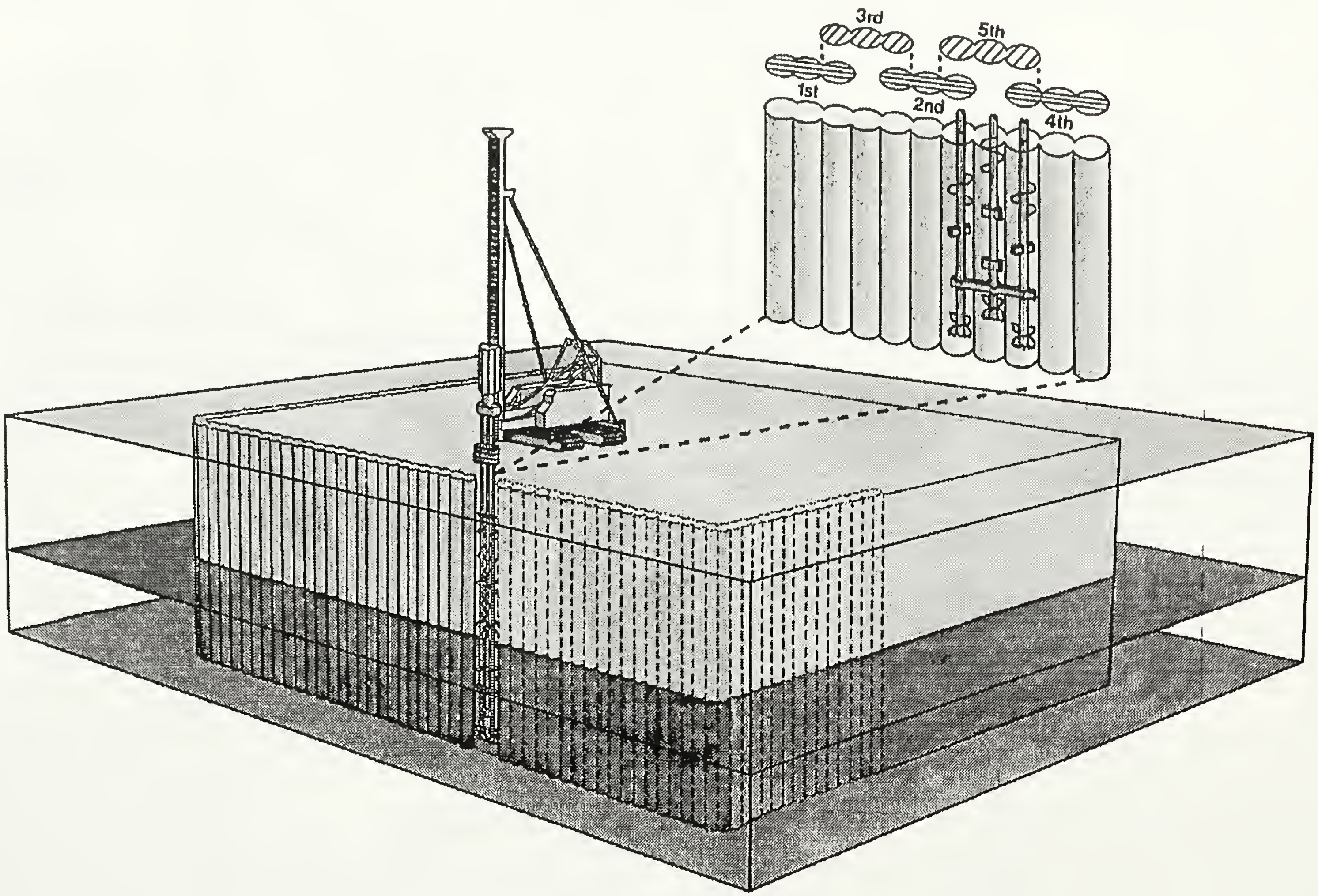
Equipment used for installation of soil-cement walls typically includes: a soil-mix wall rig for in situ soil mixing (see Figure 5.20-1), a soil-mix wall batch plant for grout preparation, a crane for installation of soldier piles, and a back hoe.

Once the soil-cement walls were in place on both sides of the alignment, excavation would begin from the surface. Horizontal cross-bracing (called struts) would be placed between the walls as excavation occurs. Groundwater that may seep from below and under the sidewalls would be pumped from the low point of excavation. Following excavation, the final structure floor and final side walls (placed inside the soil-cement walls) would be poured using steel reinforced concrete. The track bed and track would then be put in place. Figure 5.20-3 shows the proposed cross section for the retained cut portion of the alignment.

Cut-And-Cover Construction

There are two locations in which cut-and-cover construction would be used to build the CalTrain Extension: along Townsend Street from Fourth to Third, and those portions of the alignment under street right-of-way from north of Folsom Street to the Transbay Terminal site (see Table 5.20-3). Each step in this construction type is discussed below.

Support of Adjacent Structures. The first step in cut-and-cover construction is to assure support for foundations of buildings adjacent to the excavation. Underpinning of buildings adjacent to the cut-and-cover sections is not anticipated at this point. Instead, control of potential movement of adjacent structures is proposed to be accomplished by use of excavation support systems, which, in conjunction with proper excavation and bracing procedures, can serve as protection for the adjacent structures. This is common practice for the Bay Area and was successfully used for the Muni Metro Turnaround project at the east end of Market Street.



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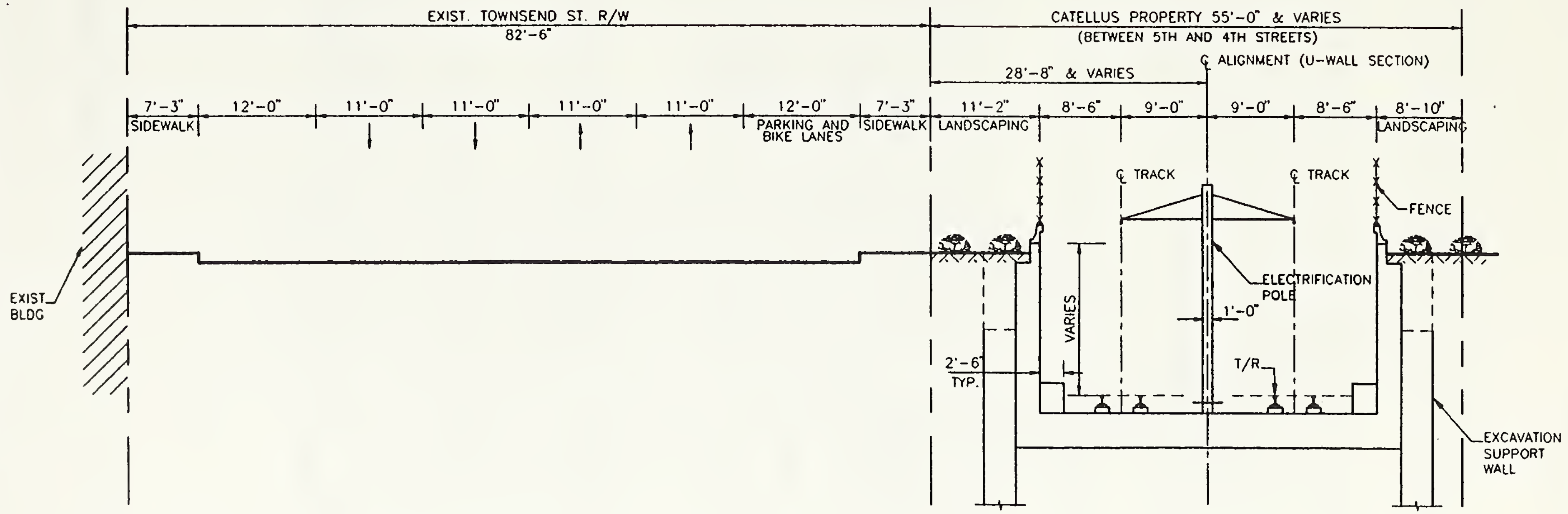
SEQUENCE OF COLUMN CONSTRUCTION FOR SOIL CEMENT WALLS

FIGURE 5.20-2


EXIST. TOWNSEND ST. R/W
82'-6"
CATELLUS PROPERTY 55'-0" & VARIES
(BETWEEN 5TH AND 4TH STREETS)
℄ ALIGNMENT (U-WALL SECTION)
28'-8" & VARIES
7'-3"
SIDEWALK
12'-0"
11'-0"
11'-0"
11'-0"
11'-0"
12'-0"
PARKING AND BIKE LANES
7'-3"
SIDEWALK
11'-2"
LANDSCAPING
8'-6"
9'-0"
9'-0"
8'-6"
8'-10"
LANDSCAPING
℄ TRACK
℄ TRACK
FENCE
ELECTRIFICATION POLE
1'-0"
VARIES
2'-6"
TYP.
T/R
EXCAVATION SUPPORT WALL
EXIST BLDG

SECTION E

RETAINED CUT TRANSITION

(LOOKING EAST)

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RETAINED CUT CROSS SECTION (SHOWING TOWNSEND SOUTH SIDE OPTION)

Figure 5.20-3

The excavation support system currently proposed for this project is described in the following sections. During construction, the JPB will monitor adjacent buildings for movement and, if movement is detected, take immediate action to control the movement.

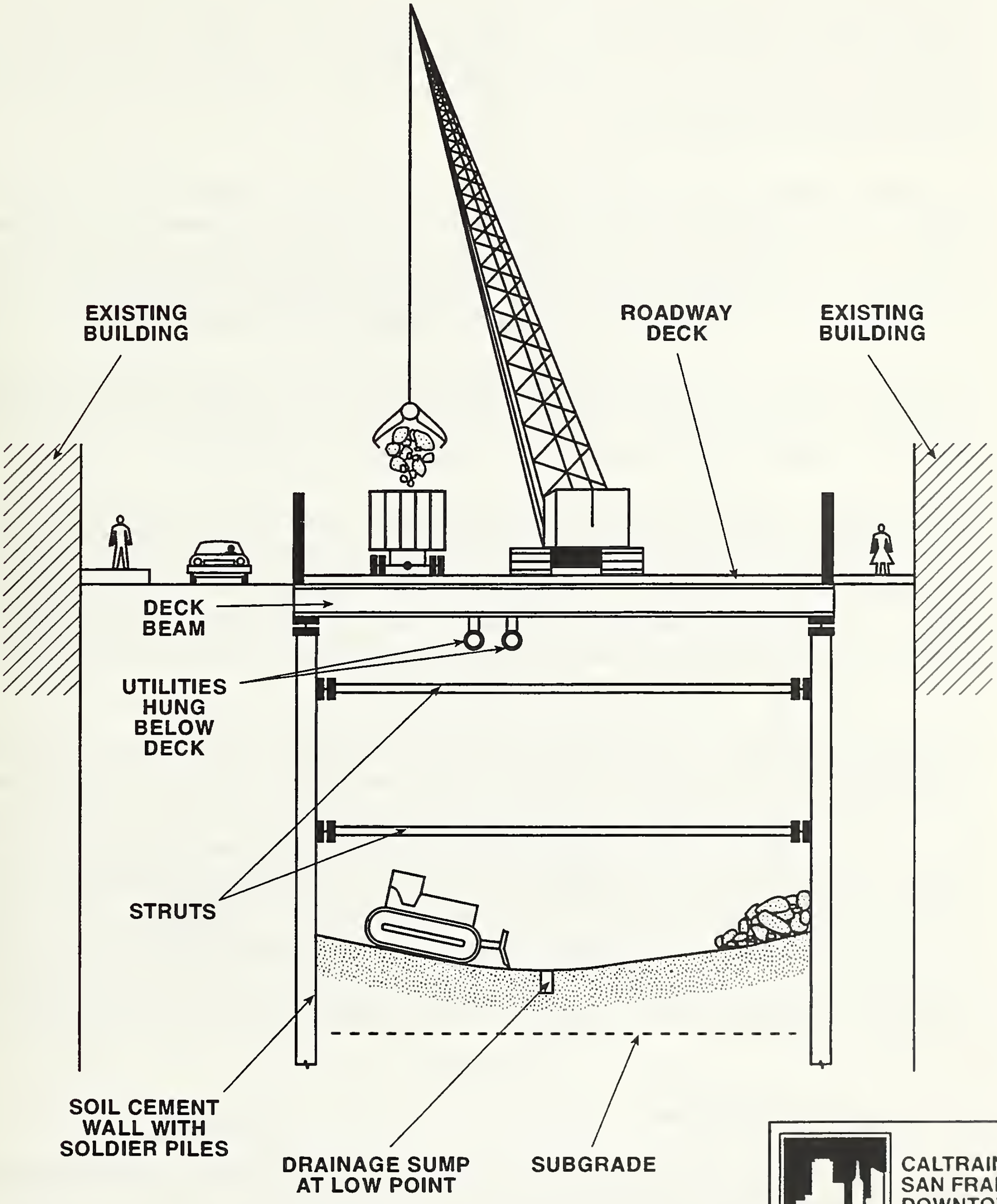
Support Walls. The second step in cut-and-cover construction is to build support walls along the sides of the alignment. As with the retained cut portion of the alignment, cut-and-cover construction would make use of the in-situ soil-cement walls described above in the Retained-Cut discussion. However, braces between the soil-cement walls would be arranged in a manner that would allow for installation of a temporary deck, which could be used as temporary traffic lanes during a portion of the cut-and-cover construction period. During construction of the support walls, traffic would still use the existing pavement.

The equipment required for installation of the soil-cement walls and soldier piles is identified in the Retained-Cut section above.

Deck Installation. The third step in cut-and-cover construction is to construct a deck (the "cover") over the excavation area. Roadway decking would be installed in progressive stages. At each soldier pile location, lateral trenches would be excavated across the alignment from one side wall to the other to permit installation of pre-cast concrete deck beams. For under-street segments, these trenches are generally excavated during the nighttime and covered to permit normal traffic flow during the day. When a sufficient number of deck beams has been installed, a shallow excavation of approximately eight feet in between the deck beams is made. This excavation is designed to uncover buried utilities and to provide room for continuing the excavation below the erected decking. It is proposed that the decking be set flush with the existing street and sidewalk levels. Figure 5.20-4 illustrates the cut-and-cover excavation and decking process.

Decking at cross-streets would be installed in stages to allow at least half of the existing traffic lanes to be maintained. After installation of the deck, full cross-street traffic could be maintained for the duration of construction.

As deck beams were installed, the utilities that can remain in the trench area (e.g., telephone, traffic, electric) would be cradled, picked up, and hung from the deck beams. Sewer lines may exist at this shallow depth and likewise would be hung from the deck beams during the initial excavation stage. Utilities located deeper would be uncovered fully after additional depth of excavation had been accomplished. Sometimes heavy utilities such as large sewer pipes are supported by an auxiliary set of beams spanning between the side walls rather than hanging them from the deck beams.


EXISTING BUILDING
ROADWAY DECK
EXISTING BUILDING
DECK BEAM
UTILITIES HUNG BELOW DECK
STRUTS
SOIL CEMENT WALL WITH SOLDIER PILES
DRAINAGE SUMP AT LOW POINT
SUBGRADE

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CUT-AND-COVER EXCAVATION AND DECKING

Figure 5.20-4

When utilities cannot be relocated outside the excavation or when they are being moved, there is a small chance of damage during excavation, causing a utility outage that can last for a few minutes to a few days. Most of the risk of hitting utilities is caused by actual utility locations being different from those shown on construction drawings. Utility service will be returned as quickly as possible after an outage.

Excavation and Bracing. The fourth step in cut-and-cover construction is excavation and bracing. The major excavation work would proceed in short segments along with the street decking. Excavated material would be removed using equipment on the deck above and would be hauled away from the job site via trucks. This activity would progress along the cut-and-cover construction segment until the excavation was complete and the deck fully installed.

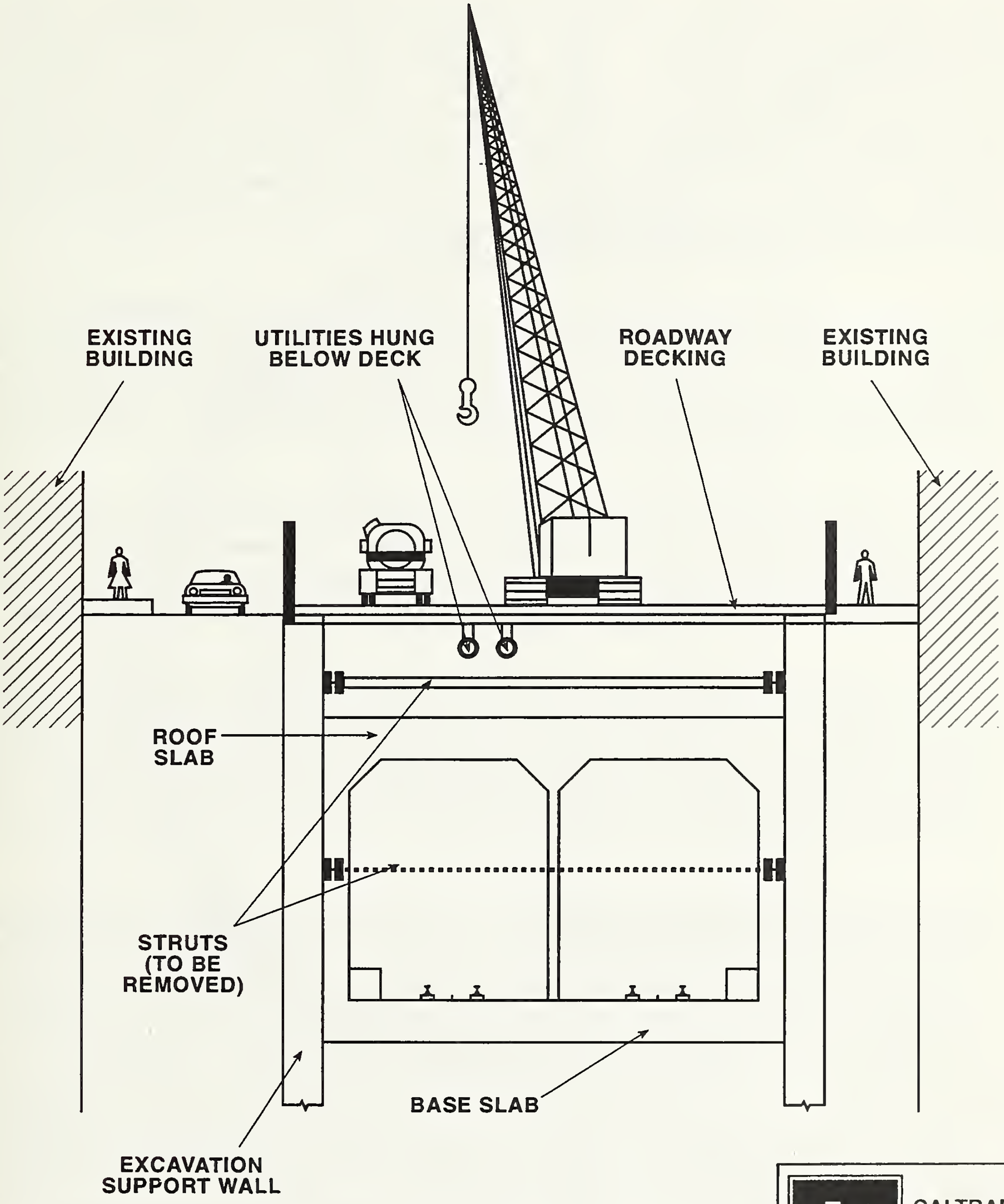
Equipment typically used for decking, excavation, and bracing includes: crawler dozer/loader, water pump, rubber-tired loader/bob cat, pavement breaker, excavator/backhoe, conveyer system, truck, crane, generator/compressor, shotcrete machine, and fork lift.

Cut-and-Cover Subway Structure Construction. The fifth step in the cut-and-cover construction is to construct the subway box (see Figure 5.20-5). The subway floor, also known as the invert or base slab, would be installed first. After a reasonable length of continuous base slab was completed, the installation of exterior walls and any interior column elements would proceed up to the underside of the top slab level that is to be supported by the walls and/or columns. The top (roof) slab would then be poured.

Street Reconstruction. To accommodate street traffic, decking would be removed, the cut-and-cover section would be backfilled, permanent utility restoration would occur, and the permanent street would be installed. With restoration of roadway pavement and vehicular traffic, the surface work on the structure would be completed and continuing activity involving tunnel finishes and equipment installations (e.g., installation of tracks, power, signals, and communication systems) could continue beneath the surface with minimal disruption to street use by vehicles and pedestrians. Because the cut-and-cover section north of Folsom Street would be off-street, it would not require the same level of street restoration or utility work. Only the cross streets at Clementina, Tehama, Natoma, Howard, First, Fremont, and Beale streets would require restoration.

Mined Tunnel Construction

Mined tunnel construction is proposed for the CalTrain Extension starting from Townsend Street, just west of Third Street and curving northward under Rincon Hill to a site just north of Folsom Street across from Essex Street. Tunneling was selected for this area to reduce construction impacts in the South Beach neighborhood based on input received at community meetings.


EXISTING BUILDING
UTILITIES HUNG BELOW DECK
ROADWAY DECKING
EXISTING BUILDING
ROOF SLAB
STRUTS (TO BE REMOVED)
BASE SLAB
EXCAVATION SUPPORT WALL

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CUT-AND-COVER SUBWAY CONSTRUCTION

Figure 5.20-5

The proposed CalTrain tunnel would pass under the Rincon Point/South Beach Historic Warehouse-Industrial District. Given the historic nature and sensitivity to settlement of the historic buildings under which the mined tunnel is proposed to be built, the JPB investigated tunneling techniques and other methods that could be employed to minimize and mitigate impacts of tunneling. Since all aspects of tunnel construction (stability of the tunnel face and roof, required temporary supports, production rates, and the permanent lining) are affected by the geology through with the tunnel would pass, subsurface geology was carefully evaluated as part of this study and is described in Sections 4.8 and 5.9.

The most critical elements in construction of the mined tunnel are the techniques used to construct the tunnel. As part of this study, the JPB evaluated subsurface geology and various methods of construction in detail. Construction techniques were developed early in the study and evaluated and modified by a Board of Consultants (recognized geotechnical experts). Specific aspects were then evaluated in greater detail [16].

Based on project review of local geology, the proposed CalTrain Extension tunnel would have to be excavated through extremely poor rock, below the groundwater table, and through mixed ground conditions (due to the high variability and high degree of rock weathering and fracturing). Tunneling under these conditions is feasible when carefully designed and constructed.

Given the rock variability, the Board of Consultants recommended that tunnel profiles be made as deep as possible to maximize the thickness of the rock above the tunnel crown. Based on this recommendation, initial tunnel profiles were deepened. Second, given the historic district located above the tunnel, methods for underpinning buildings were considered in detail. (These are discussed below.) Finally, specific ground stabilization and tunneling techniques were evaluated and are described below.

Mined Tunnel Construction Techniques. Several methods of tunneling and ground stabilization were evaluated by the JPB for constructing the tunnel. The spiling method is recommended as the safest and most efficient for the given conditions. The spiling method consists of installing steel pipes in pre-drilled holes along the floor and side walls of the tunnel, creating a strong umbrella arch over the tunnel (See Figure 5.20-6). The arch would be supported with steel ribs and/or shotcrete as excavation progresses. At any one time, only a short segment, several feet long, would be exposed between the tunnel face and the last support. The stability of the unsupported portion of the tunnel would be safeguarded by the steel reinforcing elements, which would act as short beams supported at the one end in the unexcavated rock and at the other end by the steel ribs and shotcrete. The reinforcing elements would be overlapped for increased stability.

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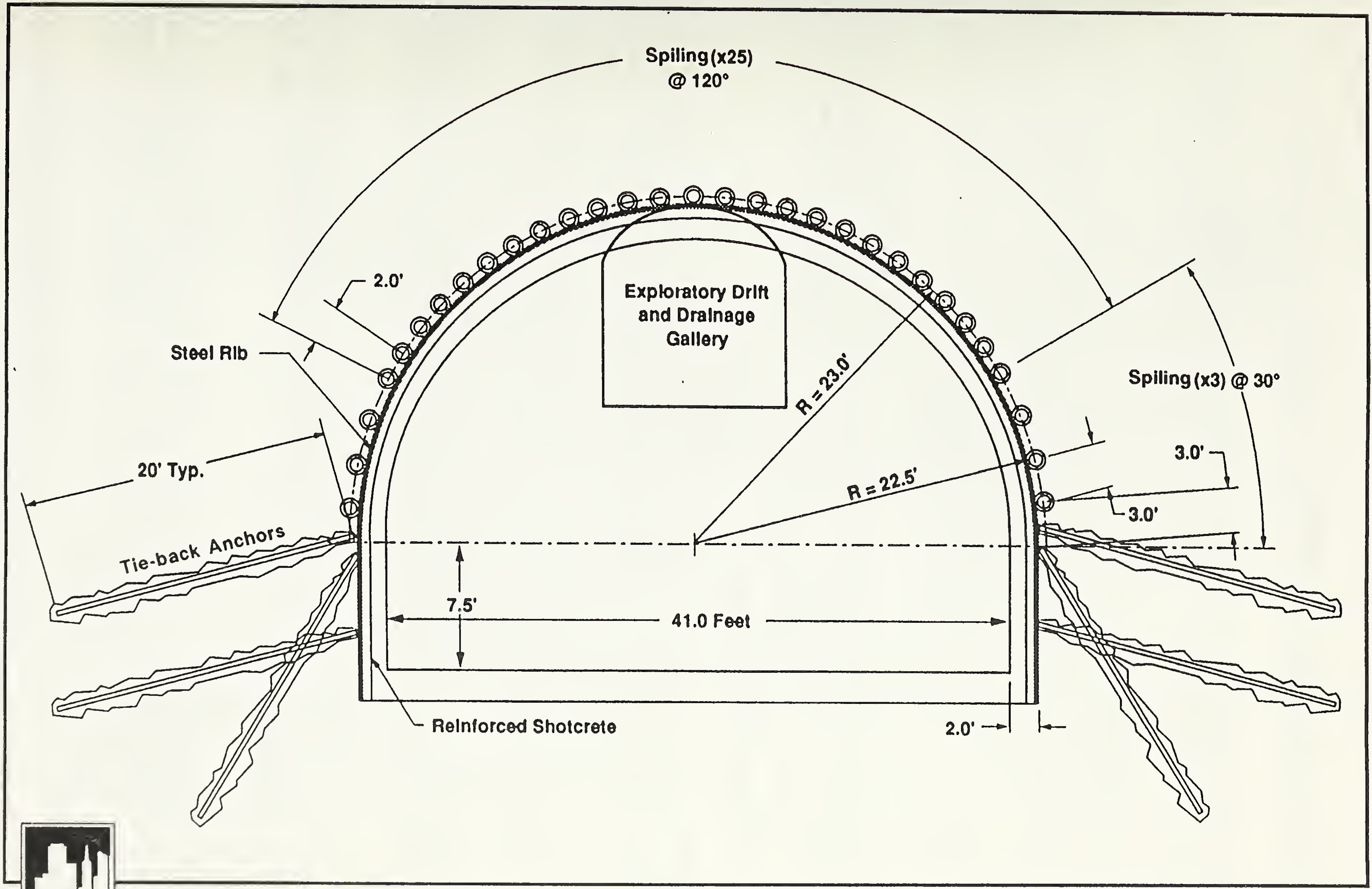
[16] *Tunnel Engineering Analysis and Cost Report, CalTrain Extension*, Dames & Moore, June, 1996; *Geotechnical Site Investigation, CalTrain Extension*, Dames & Moore, September, 1995; and Geotechnical Engineering Recommendations, Dames & Moore, December, 1995.


Spiling (x25)
@ 120°
2.0'
Steel Rib
20' Typ.
Tie-back Anchors
Exploratory Drift
and Drainage
Gallery
R = 23.0'
R = 22.5'
Spiling (x3) @ 30°
3.0'
3.0'
7.5'
41.0 Feet
Reinforced Shotcrete
2.0'

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RECOMMENDED TUNNELING OPTION

Figure 5.20-6

The length of the overlap can be varied depending on the nature of the ground encountered. In areas where the ground was found to be particularly weak and where the tunnel would pass under settlement-sensitive structures, the overlap could be up to 20 feet, as shown in Figure 5.20-7.

The spiling technique has to date been used primarily in Europe and Japan. A recent paper by Murata and Okazawa (1996) describes the application of the techniques for a tunnel project in Kobe City, Japan. The sequence of reinforcement and tunnel excavation is similar to the method proposed here for the CalTrain Extension tunnel. Settlements measured during construction of the Kobe City tunnels were less than one inch, even though the ground, consisting primarily of sands and gravels below the water table, was very susceptible to tunneling disturbance. Moreover, this tunnel was under construction during the magnitude 6.9 Kobe earthquake in 1995, and the tunnel survived the earthquake without damage.

Equipment that would be used in the construction of the mined tunnel includes: dump trucks, cement trucks, spiling rig, roadheader, rubber-tired loader/bob cats, generator/compressors. The potential exists for limited blasting to occur for those areas of tunnel that may encounter very hard sandstone.

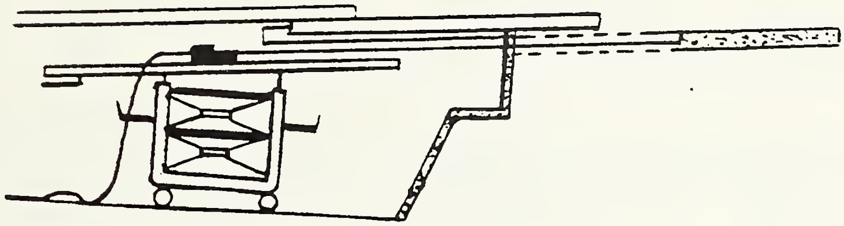
Underpinning Structure Options

During tunnel excavation, there exists the potential for deformation of the surrounding soil/rock mass, so special attention has been given to development of an appropriate mined tunnel construction program, including building underpinning options, to prevent settlement of buildings above the tunnel alignments. Existing buildings above the three alignment curves are identified based on the preliminary engineering plans. Based on these plans, seven buildings exist above the short-radius/long tunnel, nine above the medium radius/medium tunnel, and eighteen above the long-radius/short tunnel.

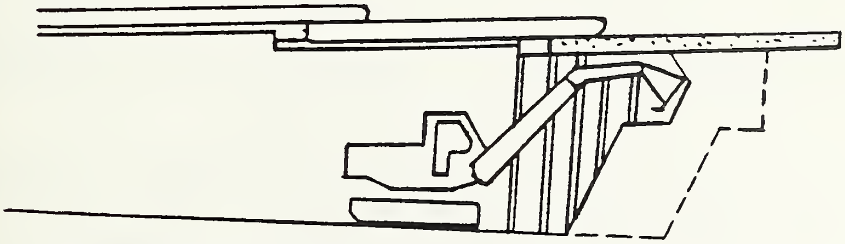
One possible means to control settlement of these building is underpinning, which means to extend an existing footing by various methods to bear on material located below the influence of adjacent or deeper excavation. Other options include improved and conservative tunneling methods, ground modification (strengthening) methods, and segmented tunnel driving.

Underpinning options for the mined tunnel portion of the CalTrain extension were evaluated. The more common and conventional underpinning schemes such as deep-mined pits/piers, jacked pipe or pin piles would be difficult and expensive to install under the existing historic buildings, and could pose a risk of damage to the structures.

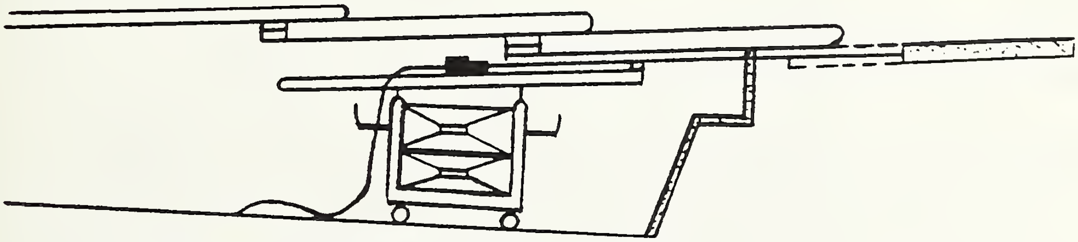
The recommended method is called controlled underpinning. The approach actually does not involve underpinning; rather, existing buildings would be carefully monitored for deformation and corrected on a continuous basis for such movement should it occur. Accordingly, the ground adjacent to or below the building would be allowed to settle a nominal amount while the building was maintained in its original position.



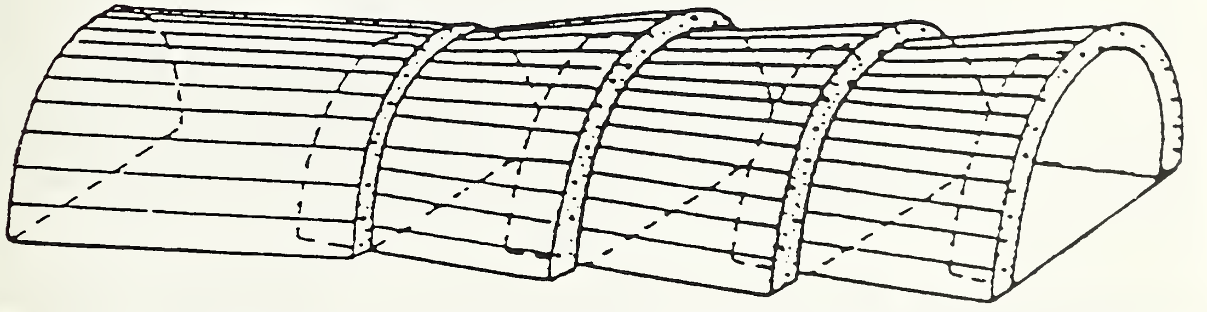
A - JET-GROUTING AHEAD OF THE FACE



B - EXCAVATION



C - JET GROUTING AT NEXT STAGE



D - GEOMETRICAL SCHEME OF TREATMENT

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SUB-HORIZONTAL
JET-GROUTING
EXECUTION SEQUENCE

Figure 5.20-7

This method would also allow for the jacking load to be introduced to the existing column and wall footings in advance of tunneling operations below. Buildings could effectively be "preloaded," which could minimize actual settlement and even allow for adjustments in some buildings that have already experienced differential settlements prior to the project. This approach was successfully used for structures along Market Street in San Francisco in advance of construction of the Muni Metro and BART tunnels.

Based on the number of structures potentially affected, the short radius tunnel route would be the most favorable from an underpinning standpoint.

A detailed underpinning approach would be developed during final design. At this point, it is anticipated that the ground and basement floors for an estimated one-half of the number of buildings under which the tunnel would pass would need to be vacated for a period of two months up to a year during the underpinning of the building and tunnel construction. Occupants would be eligible for relocation benefits and assistance similar to those for permanently relocated occupants.

Underground CalTrain Terminal Construction

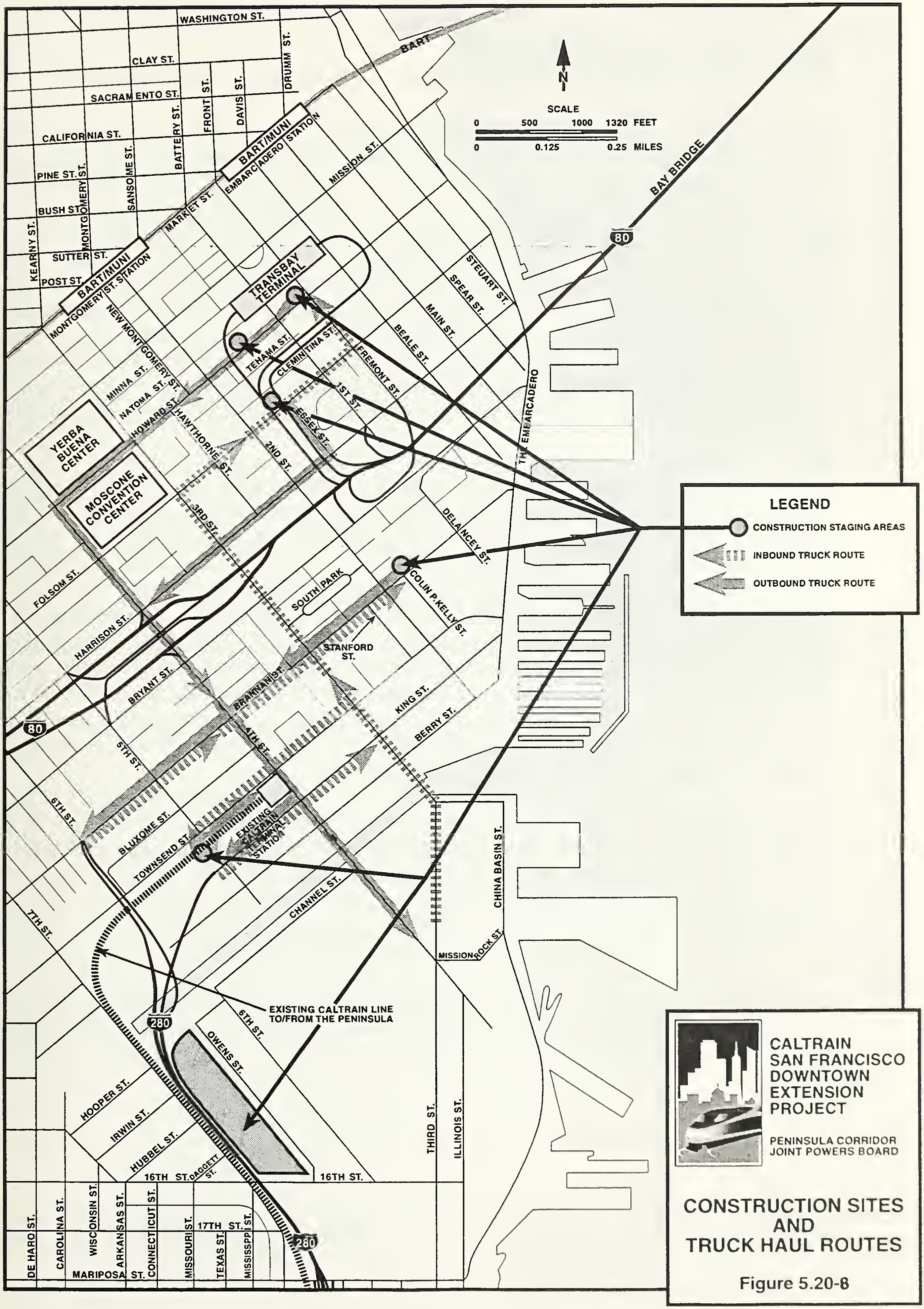
Construction of the underground CalTrain terminal would be similar in nature to the construction of any large building in San Francisco. Material would need to be excavated 25 - 30 feet below the basement level of the existing Transbay Terminal building. The sides of the excavated area would be retained using in-situ soil-cement walls or another equivalent support system as the excavation occurs.

Pile-drivers would be used to place piles under the basement slab, which would then be poured using steel reinforced concrete. This would be followed by construction of the side walls. As with other buildings, much of the train terminal construction would occur in an open trench. Equipment used for this construction likely would include concrete pump truck, dump trucks, concrete trucks, pavement breaker, crawler crane, compactor, roller, welder, trucks, generator/compressor, excavator/backhoe, crawler dozer/loader, pile drivers, soil-cement wall auger, soil-mix wall rigs, soil-mix wall batch plant and plant for grout preparation.

The station construction site would pass under First, Fremont, and Beale Streets. These streets would need to be closed temporarily in the evenings or on weekends so that a deck could be constructed for traffic use during construction of the CalTrain Terminal.

5.20.3 Contractor Work Areas

Contractor work areas (or construction staging areas) would be needed for the surface, cut-and-cover, and mined tunnel construction segments of the proposed extension. Proposed contractor work sites are shown in Figure 5.20-8.


WASHINGTON ST.
CLAY ST.
SACRAMENTO ST.
CALIFORNIA ST.
PINE ST.
BUSH ST.
SUTTER ST.
POST ST.
KEARNY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
BART
BART/MUNI EMBARCADERO STATION
BART/MUNI MONTGOMERY ST. STATION
MARKET ST.
MISSION ST.
TRANSBAY TERMINAL
STEUART ST.
SPEAR ST.
MAIN ST.
BEALE ST.
FREMONT ST.
1ST ST.
CLEMENTINA ST.
TEHAMA ST.
ESSEX ST.
NEW MONTGOMERY ST.
MINNA ST.
NATOMA ST.
HOWARD ST.
HAWTHORNE ST.
2ND ST.
3RD ST.
YERBA BUENA CENTER
MOSCONE CONVENTION CENTER
FOLSOM ST.
HARRISON ST.
BRYANT ST.
BRANNAN ST.
SOUTH PARK
STANFORD ST.
DELANCEY ST.
COLIN P. KELLY ST.
KING ST.
BERRY ST.
4TH ST.
5TH ST.
6TH ST.
7TH ST.
BLUXOME ST.
TOWNSEND ST.
EXISTING CALTRAIN STATION
CHANNEL ST.
THE EMBARCADERO
BAY BRIDGE
80
280
CHINA BASIN ST.
MISSION ROCK ST.
THIRD ST.
ILLINOIS ST.
EXISTING CALTRAIN LINE TO/FROM THE PENINSULA
OWENS ST.
HOOPER ST.
IRWIN ST.
HUBBEL ST.
16TH ST.
DAGGETT ST.
17TH ST.
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
MISSISSIPPI ST.
MARIPOSA ST.
N
SCALE
0 500 1000 1320 FEET
0 0.125 0.25 MILES
LEGEND
CONSTRUCTION STAGING AREAS
INBOUND TRUCK ROUTE
OUTBOUND TRUCK ROUTE
CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT
PENINSULA CORRIDOR JOINT POWERS BOARD

CONSTRUCTION SITES AND TRUCK HAUL ROUTES

Figure 5.20-8

For the cut-and cover construction on Townsend Street, the proposed construction staging area would be at the southwest corner of Fifth and Townsend. For cut-and-cover construction north of Folsom Street, the proposed construction staging area would be north of Folsom Street opposite the northern end of Essex Street. Both the Fifth and Townsend and north of Folsom Street sites are proposed for the long-radius mined tunnel.

An optional but desirable site from a construction standpoint would be in the parking lot of 270 Brannan Street, which has been identified for the contractor work areas for the mined tunnel portion of the CalTrain extension for the short- and medium-radius tunnel options. The advantage of this site is that it is generally in the center of the mined tunnel segment, and effective tunneling could occur in both directions. Fifth and Townsend and north of Folsom sites could also be used for the short- and medium-radius tunnels, should the optional site at 270 Brannan Street not be used.

Activities that would occur at these sites would vary, depending upon their location. Equipment employed for cut-and-cover and mined-tunnel construction is typically heavy duty, high volume machinery. Such equipment requires certain amounts of space when standing still, more for turning, and additional for maneuvering.

These sites would be the proposed location for removal of a portion of the excavated materials from retained-cut, cut-and-cover, and mined tunnel construction. High capacity trucks would carry the material away for disposal or reuse. Flat bed carriers would transport materials to these work sites. Cranes would lower steel, concrete, and other materials into the open trench. Ready-mix trucks would bring concrete to the job and dump either by chutes to the pour area or into buckets for cranes to lower to the concreting locations. Cranes are required for the lowering and lifting of other construction materials into the excavation.

Table 5.20-4 identifies the estimated number of cubic yards of material to be removed during retained cut, cut-and-cover, and mined tunnel excavation at each construction staging site, as well as estimates for materials to be removed from demolition of the Transbay Terminal and excavation for the CalTrain Station.

5.20.4 Proposed Truck Routes

Proposed truck routes for the construction staging sites are illustrated in Figure 5.20-8. An analysis of the traffic and other effects related to these truck routes is provided in Section 5.21.

Table 5.20-4
Estimated Amounts of Excavated Materials from Retained Cut, Cut-and-cover, and Mined Tunnel Construction

Construction Site Location	Sub-Option	Estimated Cubic Yards [a]
RETAINED CUT PLUS CUT-AND-COVER		
Fifth and Townsend Streets	Townsend-Center and Townsend-South Options	100,000
	Townsend-South/Subway	330,000
Folsom and Essex Streets	All	225,000
MINED TUNNEL		
270 Brannan Street	Short- and Medium Radius Curve Tunnel	280,000
Fifth and Townsend Streets	Long-Radius Tunnel	140,000
Folsom and Essex Streets		140,000
TRANSBAY TERMINAL DEMOLITION AND CALTRAIN STATION EXCAVATION		
Transbay Terminal Site	All	230,000

Note: [a] This column includes an estimated 1.15 expansion factor for soil and 1.5 expansion factor for rock, and demolished concrete due to bulking upon excavation/demolition.

Source: ICF Kaiser Engineers; De Leuw, Cather & Co. 1995.

5.20.5 Construction Phasing

Selection of a mitigation measure for demolition of the existing Transbay Terminal would affect the construction timing for the CalTrain extension and terminal. Should a replacement bus facility be built on a site other than the current Transbay Terminal, demolition of the Transbay Terminal would be delayed until the new bus facility were built. This, in turn, would delay construction of the new CalTrain terminal until after construction of the new bus facility.

Figure 5.20-9 shows a schedule for which construction of the CalTrain terminal that would not await construction of a replacement bus facility. This would be the case for the proposed Transbay Terminal Site bus facility replacement options reviewed in Chapter 6.

FIGURE 5.20-9: ESTIMATED CONSTRUCTION PHASING FOR CALTRAIN EXTENSION [a]

Activity	Estimated Duration in Months	YEARS FROM PROJECT START Year 1		Year 2		Year 3		Year 4		Year 5	
		mos. 1 - 6	mos. 7 - 12	mos 13 - 18	mos 19 - 24	mos 25 - 30	mos 31 -36	mos 37 - 42	mos 43 - 48	mos 49 - 54	mos 55 - 60
Pre-construction Activities (See Table 5.20-1)	18	▨	■	▨							
Relocate Utility Lines	12			▨	■						
Demolish Buildings [b], [c]	12				■	▨					
Demolish Bus Ramps [c]	12				■	▨					
Construct New Surface Rail Line	12						■	▨			
Construct New Surface Rail Station [d]	12						■	▨			
Construct Midday Storage Yard [e]	18						■	▨	■		
Construct Retained-cut Section & Portal	12					▨	■				
Construct Cut-and-cover Sections	18						■	▨	■		
Construct Mined Tunnel [f]	18						■	▨	■		
Construct New Underground Rail Station	24						■	▨	■	▨	
Reconstruct Streets [g]	6									▨	

Notes:

[a] Construction sequencing and phasing will vary depending upon selection of the mitigation options for the Transbay Terminal demolition -- See Chapter 6.
[b] Includes demolition of Transbay Terminal .
[c] Depending on mitigation options selected for demolition of Transbay Terminal (See Chapter 6), could be delayed until future bus facility is constructed and operating.
[d] Would only occur for Townsend Street Center and South Side options.
[e] For 7th and Townsend Street option, may be delayed until completion and operation of new CalTrain Terminal.
[f] Assumes Construction Staging Area at Brannan and Colin P. Kelly
[g] Would occur for Townsend, Howard, Tehama, Clementina, Natoma, Minna, First, Fremont, and Beale Streets.

5.21 CONSTRUCTION PHASE IMPACTS AND MITIGATION MEASURES

5.21.1 Transit Operations

Impacts to transit during construction would be due to partial street closures and increases in heavy trucks on city streets. Buses running on surface streets would be subject to the same traffic delays and congestion described below for vehicular traffic.

An additional construction impact would be the relocation of AC Transit buses to a nearby surface storage lot at Folsom and Fremont Streets. This is discussed more fully under construction impacts for the bus facility mitigation options, Section 6.24.1.

5.21.2 Vehicular Traffic

Traffic analyses for the San Francisco downtown traffic study area include the effects of the mitigation options for demolition of the Transbay Terminal, which are described in Chapter 6. Results reported in this section therefore include these effects as well.

Based on preliminary construction plans, construction impacts have been analyzed for the scenario where either an interim surface bus terminal or a permanent surface bus terminal would be built at the Main-Beale site (see Chapter 6). Construction impacts for a new structure at the Main-Beale site have not been analyzed separately since traffic operations under that option would be somewhat better than those for either surface facility given that a new bus facility could be built prior to demolition of the Transbay Terminal. That is, the analysis of surface bus facility traffic conditions described here generally represents the worst-case construction scenario.

Construction Trucks and Staging Areas

The number of construction trucks projected to be on the city streets for this analysis is based on the estimated volume of debris to be removed, the amount of materials to be brought in, the average capacity of the trucks, and the approximate time of operation. This information is summarized in Table 5.21-1 for the construction period during which the largest number of construction trucks would be operating (i.e., during the months 31 through 36 on Figure 5.20-9.) Other assumptions used in this analysis regarding this construction period include:

- A surface bus terminal at Main/Beale would be in operation with an aerial ramp touching down at Beale Street (between Folsom Street and Howard Street) serving the bus terminal.

- AC Transit would have an off-site bus storage lot at Folsom and Fremont Streets.

- Muni and SamTrans would be operating using the crescent area on Mission Street at the existing Transbay Terminal site.

- Some streets surrounding the construction area would experience partial closure (as identified in Table 5.19-2).

The volume of haul debris has been estimated based on planned dimensions of the tunnel and station. The debris volumes shown in Table 5.21-1 account for swelling of the material, with a 15 percent increase in volume for soil and 50 percent increase for rock material and concrete debris. The construction staging plans indicate that construction of the retained cut and the cut-and-cover on Townsend Street, the mined tunneling between Townsend and Folsom Streets, and the cut-and-cover north of Folsom each would take approximately 18 months. The construction of the new underground CalTrain Station is estimated to take approximately 24 months. The estimated numbers of working days per task shown in Table 5.21-1 are based on 30 days per month less 10 percent due to unforeseen circumstances such as delay in the delivery of materials, mechanical breakdown of machinery, inclement weather, etc. Fewer days per month may be appropriate based on adjacent land uses and potential area impacts, but fewer days per month would lengthen the overall construction period.

Table 5.21-1
Projected Construction Truck Volumes

Description of Work	Estimated Haul Debris (cubic yards)	Working Days Estimated Duration	Probable Working Hours per Day	Truck Capacity (cubic yards)	Estimated Number of Trucks Per Hour
Retained cut and cut-and-cover portion on Townsend Street	100,000	480	12	10	2
Mined tunnel between Townsend and Folsom Streets	280,000	480	12	10	5
Cut-and-cover portion between Folsom and the Transbay Terminal Site	225,000	480	12	10	4
New underground CalTrain Station	230,000	650	12	10	3
TOTAL	835,000	-	-	-	14

Source: ICF Kaiser Engineers; De Leuw, Cather & Company, 1996

For purpose of analysis, it is assumed that construction trucks would operate 12 hours per day. (Longer hours would shorten the overall length of construction time, but actual work hours will be determined based on area land uses and impacts.) Under this assumption, it was estimated that a total of 14 construction trucks per hour would be required to haul the debris. It was also estimated that approximately half the number of trucks hauling out debris would be needed to bring in construction materials (concrete, steel, etc.). Thus a total of 21 construction trucks per hour would be required during the construction process to haul away debris and bring in construction materials each way. Since the process would be a continuous cycle in which trucks would be arriving and departing, it is projected that, on the average, there would be 42 construction truck trips on the local street network during each operating hour. These trucks would be operating on several different streets and arriving at departing from several different construction sites, as discussed below.

Four construction staging sites have been identified, which would act as generators and attractors of construction and delivery trucks. These four sites, shown in Figure 5.20-9, are:

- Fifth Street/Townsend Street: This location would serve as one of three tunnel access shafts from which tunneling debris (soil, rocks, etc.) would be removed and to which construction supplies (steel, concrete, etc.) would be delivered.

- 270 Brannan Street (Brannan at Colin P. Kelley): This location would serve as the second of three tunnel access shafts from which debris would be removed and to which construction supplies would delivered. This site would be located approximately at the half-way point along the length of the mined tunnel.

- Essex Street just north of Folsom Street: This location would include the third tunnel access.

- Transbay Terminal Site: Two staging areas are possible for this site. Construction trucks would pick up debris and would deliver construction supplies to these sites. The sites likely would be on vacant land north of Howard Street between First and Second Streets and/or between Fremont and First Streets.

The number of trucks that would be required at each site has been calculated based on the amount of debris and soil estimated to be hauled out at each site, and the predicted distribution of trucks at each staging area is summarized in Table 5.21-2.

Table 5.21-2
Distribution of Trucks at Each Construction Staging Site

Staging Site	Estimated Average Number of Excavation Removal and Delivery Trucks per Hour	
	In	Out
Transbay Terminal	5	5
Essex Street/Folsom Street	6	6
270 Brannan Street	7	7
Fifth Street/Townsend Street	3	3
TOTAL	21	21

Source: Korve Engineering, Inc.

Truck Routes

The routes for construction and delivery trucks to and from the staging sites are illustrated in Figure 5.20-9. There would be two distinct patterns in the truck routes:

- All trucks hauling out demolition debris and excavation spoils would be southbound via the I-280 freeway. These trucks would return via the same path.
- Construction materials such as concrete and steel are assumed to be provided from a local staging site, somewhere in the Mission Bay area, possibly the Sixteenth and Owens yard site. Thus, trucks bringing in construction materials are assumed to originate from the industrial area just south of the Mission Creek Marina and east of the I-280 freeway.

Truck routes to and from each of the staging sites are described below:

- **Transbay Terminal Sites**. Debris and soil would be hauled out via Howard, Fourth, and King Street to the I-280 freeway southbound on-ramp. These trucks would return via the I-280 northbound off-ramp at King to Third and then Folsom Streets, and then travel on Second Street or Fremont Street. Construction materials would be hauled in via Third and Folsom Streets leading to Second Street or Fremont Streets. These trucks would return via Howard Street and Fourth Street.
- **Essex Street/Folsom Street**. Debris would be hauled out via Essex, Harrison, Fourth, and King Streets to the I-280 freeway southbound on-ramp. These trucks would return via the I-280 freeway northbound off-ramp at King to Third Street and then to Folsom Street. Construction materials would be hauled in and returned via Third, Folsom, and Fourth Streets.
- **Brannan Street/Second Street**. Debris would be hauled out and trucks would return via Brannan Street and the I-280 freeway on- and off-ramps at Sixth Street. Materials would be brought in and trucks would return via Third, Brannan, and Fourth Streets.
- **Fifth Street/Townsend Street**. Debris would be hauled out and trucks would return via the I-280 freeway on- and off-ramps at King Street. Materials would be brought in via Third and Townsend Streets and return via Townsend and Fourth Streets.

Impacts

Local street traffic would be affected both by lane closures and by the presence of construction trucks on the roadway. Third Street and Fourth Street would be most heavily affected by construction-related traffic, since these two streets would serve as the primary access routes to and from the I-280 freeway and the construction staging sites. There would be approximately 12 trucks per hour running on Third Street and Fourth Street on a continuous cycle, during 12 working hours of a typical working day. These two streets would also serve as the primary access routes for delivery of construction materials from the industrial sites.

Brannan Street would also experience some construction truck traffic. Approximately seven trucks per hour would be running along Brannan Street between 270 Brannan and the I-280 on/off ramp at Sixth Street.

Intersection Level of Service. Table 5.21-3 presents the year 2000 intersection level of service for the No-Build and 2000 CalTrain Extension (construction phase) Alternatives for both the AM and PM peak hours.

In general, level of service remains the same with some localized degradation due to either increased truck volumes, lane closures, or additional buses on the surface streets.

The following study intersections would be affected:

- **Folsom Street at Fremont and Beale Streets.** During the AM peak period, the Folsom/Fremont intersection would be heavily utilized by commuters exiting the I-80/Bay Bridge at the Fremont/Folsom Street off-ramp, thus resulting in LOS D in the No-Build Alternative. During the construction period, this intersection would also be utilized by trucks turning left from Folsom Street onto Fremont Street, to gain access to the construction site at the Transbay Terminal.

  Traffic operations at the Folsom/Fremont street intersection would also be affected in the AM peak by the traffic conditions at the downstream intersection at Folsom and Beale streets. There would be heavy bus traffic at the intersection of Beale and Folsom streets from buses traveling between the temporary storage yard (at the northwest corner of Beale Street/Folsom Street) and the surface bus terminal. The combination of heavy commuter vehicle demand, construction trucks, and bus activity at the downstream intersection would result in a degradation in the level of service at this intersection within the LOS D range during the AM peak hour during the construction period.

  During the PM peak hour, level of service would remain at LOS B. Vehicle demand at this intersection would be lighter during the evening. Truck traffic from construction would be absorbed without much added delay. Average delay at this intersection would increase by one second per vehicle during the PM peak hour.

- **Third/Townsend Streets**. This intersection would degrade slightly from LOS C to LOS D in the PM peak hour because of construction traffic and activity along Townsend Street interacting with moderate Third Street traffic volumes. The AM peak hour would maintain LOS B.

Table 5.21-3
Signalized Intersection Delay (sec/veh) and LOS Summary Year 2000 AM and PM Peak Hour (Construction Period)

Intersection	AM Peak				PM Peak			
	No-Build		CalTrain Extension		No-Build		CalTrain Extension	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Battery & Bush	41	E	49	E	65	E	91	F
2. Market & Fremont	8	B	8	B	8	B	7	B
3. Market & Beale	8	B	8	B	8	B	7	B
4. Mission & First	12	B	18	C	8	B	9	B
5. Mission & Fremont	9	B	11	B	10	B	10	B
6. Mission & Beale	10	B	10	B	7	B	7	B
7. Mission & Main	9	B	5	A	11	B	12	B
8. Howard & Second	5	A	8	B	11	B	17	B
9. Howard & First	9	B	8	B	12	B	12	B
10. Howard & Fremont	9	B	8	B	9	B	9	B
11. Howard & Beale	9	B	7	B	4	A	7	B
12. Howard & Main	7	B	4	A	12	B	9	B
13. Folsom & Second	9	B	9	B	10	B	12	B
14. Folsom & Essex (1)	9	A	9	A	9	A	0	A
15. Folsom & Fremont	27	D	37	D	10	B	10	B
16. Folsom & Beale	8	B	14	B	8	B	7	B
17. Folsom & Main	7	B	10	B	8	A	9	A
18. The Embarcadero & Folsom	17	C	16	C	14	B	13	B
19. Harrison & Essex St	8	B	8	B	11	B	11	B
20. Harrison & First	4	A	9	A	7	B	7	B
21. Harrison & Fremont	9	B	8	B	4	A	4	A
22. The Embarcadero & Harrison	7	B	7	B	11	B	10	B
23. Third & Townsend	11	B	11	B	22	C	26	D
24. Fourth & Townsend	11	B	11	B	10	B	10	B
25. Fifth & Townsend (2)	8	B	8	B	11	B	12	B
26. Third & King	23	C	23	C	30	D	31	D
27. Fourth & King	10	B	10	B	10	B	10	B

(1) Unsignalized Under Both No-Build and Build scenarios
(2) Denotes Unsignalized Intersection Until the Build Scenario

Source: Korve Engineering, Inc.

- All other intersections would maintain LOS C or better except for Battery Street and Bush Street, which is projected to operate at LOS E in the morning peak hour and LOS F in the afternoon peak hour. The intersection LOS degrades somewhat due to project conditions, but does not change its level of service.

Summary. Any construction traffic occurring between 7 and 9 AM or between 3:30 and 6 PM would coincide with peak commute hour traffic. As identified above, none of the analyzed intersections would deteriorate from an acceptable level of service (LOS D or better) to an unacceptable level of service (LOS E or F) as a result of the construction activity related to the CalTrain Extension Alternative.

Mitigation

While no construction related traffic impacts are expected, it may be desirable that construction-related traffic be restricted to hours outside the peak commute periods to minimize conflicts with commute traffic. In that case, it may not be possible to accommodate the necessary number of construction trucks within the currently estimated construction schedule, making changes to the schedule necessary or increasing the number of trucks trips made during non-peak hours.

While no specific mitigation measures are presented to address construction traffic (since no specific impacts of the project have been identified), construction of the CalTrain extension will be completed in a manner designed to reduce impacts of the project. These steps are outlined in the construction techniques section (5.20). For example, traffic capacity will be maintained to the maximum extent possible through the use of cut-and-cover construction on Townsend Street and north of Folsom. Additionally, tunnels will be constructed from Townsend/Third to Folsom/Essex in order to eliminate construction traffic from the South Beach neighborhood.

5.21.3 Parking

On-street parking would need to be removed along the Townsend Street Segment in locations where cut-and-cover construction would occur in the street right-of-way. During construction of any of the Townsend Street options, on-street parking would be removed from the south side of Townsend Street between Third and Sixth Streets and from the north side of Townsend between Third and Fourth Streets. This loss of parking would affect local businesses, as discussed in Section 5.21.5.

5.21.4 Pedestrians/Non-Motorized Traffic

Substantial construction activity would occur along First Street and Fremont Street between Mission and Howard in order to complete the proposed CalTrain Terminal. Half of the street would be completely cut off and the sidewalk closed for a short period of time. The sidewalk across the street would be reduced to five feet. Later, the opposite side of the street would be closed and the sidewalk on the open half would be reduced to five feet. Four corners would be affected when the west side of the street is closed and likewise four corners would be affected when the east side of the street is closed.

5.21.5 Neighborhoods and Businesses

In general, business and residential impacts would include changes in traffic circulation attributable to partial street closures, some loss of on-street parking, increased truck as well as auto traffic on designated haul routes and detours, increased noise in the vicinity of surface construction, and views obstructed or worsened by construction activity.

The CalTrain Extension Alternative would be constructed through three basic areas. Each would be affected differently depending upon the local land uses and the specific construction activity taking place. This section describes impacts in each of the three segments and proposed mitigation measures. The disruption of residents and businesses during construction is an important concern of the JPB. Measures would be incorporated in the construction program to minimize impacts to residents and businesses.

Townsend Street Segment

The greatest concentration of businesses potentially subject to adverse impacts during construction of the CalTrain Extension is along Townsend Street, between Third and Seventh streets. Cut-and-cover construction methods would be utilized along this corridor, resulting in reduced vehicular access and increased traffic congestion, increased noise and debris, and decreased visibility of operating businesses. These disruptions are anticipated to last for approximately 24 months, and would most likely have the greatest impact on the retail establishments concentrated between Third and Fourth streets. Restaurants and local-serving retail businesses located on this block rely more heavily on walk-in traffic and street visibility for sales activity than the office and warehouse businesses located on the neighboring Townsend Street blocks.

The Muni Metro Turnback Project in downtown San Francisco serves as a meaningful case study from which to predict how Townsend Street businesses would be affected by project construction. Businesses located along The Embarcadero, fronting the cut- and- cover construction of the Muni Metro project, have experienced partial or complete loss of visibility and access. Where possible, these businesses reoriented themselves to Steuart Street. Several hotel and restaurant owners whose businesses were affected by severe noise and debris were successful in negotiating to cease all construction activity between 12:30 and 1:30 p.m. daily, in order to allow for more comfortable lunch hour operations. One small delicatessen, which lost all visibility due to construction fences that were assembled around the project, was offered reduced rent by the building owner for the duration of construction to offset sales losses.

Each of the three Townsend Street alignment options poses different potential impacts on local businesses. Construction of the Townsend Street-Center Alignment Option, in which the CalTrain alignment and new surface station would be located in the median of a widened Townsend Street, would restrict large auto and truck access between Fourth and Seventh Streets. The inability of large trucks to load and unload at warehouse and storage facilities may affect the ability of businesses to sustain successful operations at their current locations for the duration of construction and in the long-term.

The Townsend Street-South Side Alignment would align the CalTrain extension and new surface station to the south of Townsend Street, eliminating accessibility impacts to warehouse and storage facilities on the north side of the street. Additionally, construction between Fourth and Seventh Streets would occur to the south of Townsend Street on Catellus property, reducing the construction-related disruptions to businesses in this segment.

The Townsend Street-South/Subway Alignment Option, which involves the longest tunnel alignment but no new CalTrain station in the Mission Bay area, would likely have similar impacts as the South Side Option. However, given the more extensive tunneling required, this option entails additional construction work and moving of earth, which could result in greater construction-related disruptions to businesses located along Townsend Street.

In addition to warehouse and storage facilities, low-rise office buildings and neighborhood retail are located along Townsend Street. Cut-and-cover construction activities would adversely affect these businesses, which are highly concentrated between Third and Fifth Streets. Traffic congestion, reduced access, reduced visibility of retail shops, and unpleasant noise and debris are expected to have adverse effects on local businesses, in a manner similar to that experienced by businesses located on The Embarcadero during construction of the Muni Metro Turnback. It is anticipated that during construction, vehicular traffic would be limited to one lane along Townsend, compared with two lanes of traffic in each direction between Second and Fourth streets currently.

The loss of on-street parking spaces also raises issues related to economic impacts. Several blocks of unmetered parallel parking spaces would be temporarily lost along Townsend Street during construction of the Townsend alignment, potentially exacerbating difficult conditions for local business owners, particularly the small retailers located between Third and Fifth Streets.

Mined Tunnel Segment

The JPB has taken steps to address construction impacts on neighborhoods and businesses in this segment of the CalTrain Extension Alternative by proposing mined-tunneling. As discussed in Chapter 2, cut-and-cover construction techniques were rejected due to potentially adverse construction impacts, and several mined-tunnel construction techniques have been evaluated to determine the safest and least disruptive construction methods (see Section 5.20).

This segment is entirely tunnel, with three alignment options, as follows: a Short-Radius/Long Mined Tunnel Alignment; a Medium-Radius/Medium Mined Tunnel Alignment; or a Long-Radius/Short Mined Tunnel Alignment. The areas through which these tunnel alignments pass are generally mixed-use commercial/industrial/office with some scattered residential. The greatest concentration of residential uses is in the South Beach area, which includes the Steamboat Point Apartments, South Beach Marina Apartments, the Delancey Street Project/Embarcadero Triangle, and Bayside Village Apartments. This area is east of the mined tunnel alignments and would be largely unaffected by construction activity, except for potential traffic congestion due to increased truck traffic and temporary detours in the general area. The Short-Radius/Long Mined Tunnel Alignment, which turns north under Townsend Street along Colin P. Kelly Street, would be the closest of the mined tunnel options; however, all activity would occur underground and no surface staging areas are proposed until the tunnel is north of Brannan Street (see below).

Elsewhere, residential uses are found in mixed-use developments, typically occupying the upper floors as live-work lofts or similar development. Relatively few, if any, residential units are located directly above the tunnel alignments. As noted in the description of construction staging, the basement and ground level floors of some buildings directly along the mined tunnel alignments may need to be vacated for a period of two months to a year during the underpinning of structures and tunnel construction. The specific properties affected would be determined during engineering for final tunnel design. Based upon preliminary field surveys, no residential units would be displaced during construction. Based upon the mined tunnel alignment and the limited surface impacts of mined tunnel construction, the potential for disruption of residential uses is considered minor. The integrity of neighborhoods is not anticipated to be substantially affected by CalTrain Extension Alternative in the mined tunnel segment.

A number of businesses above the mined tunnel would need to be vacated during the underpinning of structures and tunnel construction. Approximately eight properties with 21 affected businesses on the basement and ground floors are located along the Short-Radius/Long Mined Tunnel Alignment; approximately 13 properties with 32 affected businesses are located along the Medium Radius/Medium Mined Tunnel Alignment; and approximately 21 properties with 45 affected businesses are located along the Long-Radius/Short Mined Tunnel Alignment. Half of the structures on these properties may require underpinning. Affected businesses would likely need to be relocated in order to maintain operations. Other potential impacts to businesses in the mined tunnel segment would include increased traffic congestion due to truck traffic and temporary reroutes.

Three surface staging areas would possibly be utilized for tunnel construction: Fifth at Townsend Street, 270 Brannan Street (Brannan at Colin P. Kelly Street), and Essex at Folsom Street. Construction staging sites would generate truck traffic and noise from heavy equipment, thereby potentially affecting adjacent business activity. The site at Brannan and Colin P. Kelly Street would include a tunnel access shaft where tunnel debris would be removed and supplies brought in. Its use would displace the parking and billiards parlor businesses on the site. The staging site at Essex and Folsom Streets is at the north end of the tunnel segment; it would include a tunnel access shaft and serve as the starting point for cut- and- cover construction to the north. The property is currently owned by Caltrans and used for parking.

Folsom to Transbay Terminal Segment

No residential uses would be directly affected by construction of this segment. Indirect effects on the limited residential uses in the vicinity of the proposed project, including new residential live/work projects north of Folsom Street, would include traffic congestion from heavy vehicles and temporary street closures, increased noise, possible dust, and obstructed or deteriorated views.

This segment is entirely cut-and-cover or open cut (for the station) and continues across several east-west streets important for business access. Properties directly along the CalTrain alignment would be acquired and the eligible displaced businesses provided relocation assistance. No vacating of adjacent properties is proposed. The major impacts would be the circulation, congestion and access effects from construction across several roadways and noise from construction activity. See Table 5.20-2 for a listing of affected streets.

Streets would be kept open to traffic whenever possible to minimize reroutes and congestion that might affect business transportation services (e.g., deliveries, shipments, visitors). Temporary street closures to provide decking for cut-and-cover construction would be scheduled at night or on weekends. Where a partial street closure is proposed, a minimum level of access would be provided from one or the other direction or from an alternate street. The types of businesses that are along roadways likely to be most affected by construction include:

Clementina Street. Distribution, manufacturing (wood furniture), offices. A distribution center has one large and three smaller loading docks accessible from the roadway. A wood manufacturing complex has two loading areas.

Tehama Street. Office, furniture warehouse/distribution, garage/office, multi-story photography lab and supply; multi-story clothing manufacturer and warehouse, small service businesses. A total of 18 loading docks or entrances serve these establishments from Tehama Street.

Natoma Street. Multi-story office, small office/professional, restaurant/cafe, warehousing, graphics arts and engraving, information systems/processing, clothing manufacturing, parking. The roadway segment between First and Second Streets includes approximately seven loading docks or delivery entrances, although not all appear to be active, and restaurants. The roadway segment between First and Fremont streets serves the clothing manufacturer and larger warehousing uses and includes three loading docks.

Minna Street. Shoe store, restaurants, multi-story office, warehousing, multi-story residential with garage, wholesale stationery, small services businesses, parking. There are nine loading docks or areas along the roadway that may require truck access.

Field visits have recorded relatively light levels of truck and delivery traffic on these streets overall. Many uses are in transition. Specific measures to maintain a minimum level of access to Natoma and Minna streets in the area north of the proposed CalTrain Station are described in the following subsection under mitigation.

Mitigation

Prior to initiating construction on major elements of the CalTrain Extension Project, outreach efforts would be performed to inform residents, businesses, and property owners of the proposed construction program. A community construction coordination program would be established to encourage communication between the affected community, both residential and business, and the JPB regarding construction impacts and possible mitigation and solutions.

Prior to and during construction, the JPB staff would contact and interview individual businesses and property owners potentially affected by construction activities. Interviews with commercial establishments would provide knowledge and understanding of how these businesses carry out their work, and identify business usage, delivery and shipping patterns and critical times of the day and year for business activities. Data gathered from these interviews would assist the JPB as it works with the DPT to develop the worksite traffic control plans. Among other elements, these plans will identify alternate access routes to maintain critical business activities.

During construction of the cut-and-cover segment north of Folsom Street and construction of the CalTrain Terminal Station (and during construction of bus mitigation Options B or D, as described in Chapter 6), a new public roadway is proposed that would allow for the pass through of traffic between Natoma and Minna streets just west of the West Loop bus ramps. This roadway would provide for through access and egress to businesses.

The mitigation measures described in the following sections would be implemented by a combination of construction contract specifications, drawings, and provisions, as well as public affairs programs. JPB staff would be assigned to work directly with the public to provide project information and to resolve construction-related problems. The JPB will work with community residents, elected officials, local businesses, and community organizations to tailor the mitigation program to best meet community needs. Contractors will be monitored to assure that mitigation measures contained in the Final EIS/EIR are met.

The JPB would inform the public of its progress in implementing the measures selected through a quarterly program of auditing, monitoring, and reporting. A quarterly status report would be made available to the public.

Site and Field Offices. During construction of the CalTrain Extension, JPB staff would establish an information field office located along the alignment. The field office staff in conjunction with other staff would serve multiple purposes:

- provide the community and businesses with a physical location where information pertaining to construction can be exchanged,
- enable JPB to better understand community/business needs during the construction period,
- allow JPB to participate in local events in an effort to promote public awareness of the project,
- manage construction-related matters pertaining to the public,
- notify property owners, residences, and businesses of major construction activities (e.g., utility relocation/disruption and milestones, re-routing of delivery trucks),
- provide literature to the public and press,
- promote and provide presentations on the project via a Speakers Bureau,
- respond to phone inquires,
- coordinate business outreach programs,
- schedule promotional displays,
- participate in community committees.

The information office would be open various days of the work week for the duration of the construction period. A schedule will be developed before construction begins.

Information Line. An telephone information line would be available to provide community members and businesses the opportunity to express their views regarding construction. Calls received would be reviewed by JPB staff and would, as appropriate, be forwarded to the necessary party for action (e.g., utility company, fire department, the Resident Engineer in charge of construction operations). Information available from the telephone line would include current project schedule, dates for upcoming community meetings, notice of construction impacts, individual problem solving, construction complaints and general information. During construction of the project, phone service would be provided in English, Cantonese, and Spanish and would be operated on a 24-hour basis.

Signage. The JPB would work with establishments affected by construction activities. Appropriate signage would be developed and displayed to direct both pedestrian and vehicular traffic to businesses via alternate routes.

Traffic Management Plans. Traffic management plans to maintain access to all businesses would be prepared for areas affected by surface or cut-and-cover construction. In addition, daily cleaning of work areas would be performed by contractors for the duration of the construction period. Provisions would be contained in construction contracts to require the maintenance of driveway access to businesses to the extent feasible.

Deck Level. Decking at the under-street cut-and-cover sections would be installed flush with the existing street or sidewalk levels.

Sidewalk Design and Maintenance. Wherever feasible, sidewalks would be maintained at the existing width during construction. Where a sidewalk must be temporarily narrowed during construction (e.g., deck installation), it would be restored to its original width during the majority of construction period. In some places this may require placing the temporary sidewalk actually on the deck. Each sidewalk design should be of good quality and approved by the Resident Engineer prior to construction. Handicapped access would be maintained during construction where feasible.

Construction Site Fencing. Construction site fencing should be of good quality, capable of supporting the accidental application of the weight of an adult without collapse or major deformation. Fence designs or examples would be submitted to the Resident Engineer for approval prior to installation. Where covered walkways or other solid surface fencing is installed, a program will be implemented to allow for art work (e.g., by local students) on the surface(s).

5.21.6 Community Facilities and Services

None of the community facilities identified in Section 4.3 would be affected by construction activities, except to the extent that traffic delays caused by temporary detours and congestion may inconvenience persons gaining access to these facilities.

Safety and security services during construction would be provided by the San Francisco Police Department and other security personnel identified in Sections 4.3 and 5.17. The San Francisco Police Department anticipates that it would have to assign officers to monitor traffic congestion and detours along surface streets during construction. However, it is likely that existing officers would be assigned to this task, and at this time no additional costs to the Department are anticipated. While emergency access would potentially be affected by any change in traffic conditions in the area, the traffic impacts of the project would be very minor and should not affect emergency response times.

5.21.7 Parklands, Schools, and Churches

None of the parks, schools, or churches identified in Section 4.4 would be affected by construction activities, except to the extent that traffic delays caused by temporary detours and congestion may inconvenience persons gaining access to these facilities.

5.21.8 Air Quality

Construction activities can cause pollutant emissions in a number of ways, including emissions of nitrogen oxides, carbon monoxide, and sulfur oxides from diesel-powered construction equipment; carbon monoxide emissions from worker vehicles; dust or PM10 emissions from vehicles traveling on unpaved surfaces and/or grading and other earthmoving activities; and reactive organic gas emissions from asphalt placement and architectural coatings.

Construction-related air quality effects of the CalTrain Extension Alternative were estimated by using construction schedules and engineering drawings of the proposed project to develop a worst-case daily emission level for each phase of construction, or for each group of phases, where phases would occur simultaneously.[17] Though estimates are conservative, and construction emissions would be temporary and intermittent, mitigation measures are proposed.

Construction Period Emissions

Project-related construction air quality emissions would occur over an estimated six-year period. Table 5.21-4, illustrates the "worst case" daily construction emissions by phase for the proposed project.

Table 5.21-4
Worst Case Daily Construction Emissions for Each Phase of Construction

Phase [a]	Pollutant (Pounds per day)				
	Carbon Monoxide	Reactive Organic Gas	Nitrogen Oxides	Particulates (PM10)	Sulfur Oxides
1A Clear Main/Beale Site for Bus Terminal Construction 1B Clear Existing CalTrain Terminal Site for Subway Construction	365.55	33.89	194.19	273.57	11.64
2A Construct New Bus Terminal 2B Construct CalTrain Subway in Mission Bay	963.86	102.56	627.24	1135.13	30.3
3A Demolish Existing Transbay 3B Terminal/Excavate Terminal Basement and Subway	1045.05	100.91	571.33	1291.55	31.78
4A Construct CalTrain Downtown Terminal (Concurrent with 3B)	1005.98	91.16	478.65	969.23	28.55
4B Construct Mined Tunnel	563.12	49.63	258.01	525.77	16.63
4C Construct CalTrain Storage Yard Surface Tracks and Station	140.44	11.83	45.31	3.52	2.32
4D Procure Electric Locomotive Trailers or New Locomotives	No measurable construction emissions				
5A Furnish & Install Station Finishes 5B Furnish & Install all System Elements, Including Rolling Stock	79.36	25.44	8.32	0.22	0.37

[a] Phases listed together indicate occurrence at the same time. The worst case elements (days on which daily emissions are estimated to be highest) from each phase are combined when they are likely to occur together.

Source: Terry A. Hayes Associates, June 1996.

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[17] Emission factors for construction equipment and other assumptions were based on the BAAQMD CEQA Guidelines, Bay Area Air Quality Management District, April 1996, Page 28. Where BAAQMD guidance was not available, assumptions were derived from the South Coast Air Quality Management District's CEQA Air Quality Handbook, April 1993, or from the U.S. Environmental Protection Agency Compilation of Air Pollutant Emission Factors, Volume I: Stationary, Point, and Area Sources, AP-42, 5th Edition, January 1995.

Where phases are listed together, it may be assumed that these would occur at the same time, and the worst-case days from these two phases have been combined. In some cases, worst-case daily emissions could be slightly less, depending on which mitigation option is selected for replacement of the Transbay Terminal, as described in Chapter 6.

Mitigation Measures

There are no quantitative emissions thresholds for construction activities, which are by their nature temporary and which occur over a large area, potentially affecting different receptors at different times. Nonetheless, specific construction practices can minimize or control certain emissions, and the following mitigation measures, which are derived from the "basic control measures" and the "enhanced control measures" recommended by the BAAQMD, are proposed as part of the project.

As part of the contract provisions, the project contractor would be required to implement the following measures at all project construction sites:

- Water all active construction areas at least twice daily. Ordinance 175-91, passed by the San Francisco Board of Supervisors on May 6, 1991, requires that non-potable water be used for dust control activities; therefore the project contractor would be required to obtain reclaimed water from the City's Clean Water Program or other appropriate sources.
- Cover all trucks hauling soil, sand, and other loose materials *or* require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites, and
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways, and
- Replant vegetation in disturbed areas as quickly as possible.

The BAAQMD approach to the analysis of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions.

Following implementation of all of the above control measures, air pollutant emissions from construction activities would be considered less than significant.

5.21.9 Noise and Vibration

Construction noise would vary depending on the construction process, type and condition of equipment used, and layout of the construction site. The noise impact assessment for a construction site is based on:

- Estimates of the type of equipment that will be used during each phase of the construction and the average daily duty cycle for each category of equipment,
- Typical noise emission levels for each category of equipment such as those in Table 5.21.5, and
- Estimates of noise attenuation as a function of distance from the construction site.

Table 5.21-5 summarizes relevant data on noise emissions of construction equipment from the FTA Guidance Manual.[18] Shown are the average of the L_{max} values for various types of equipment at a distance of 50 feet. Although the noise levels in the table represent typical values, there can be wide fluctuations in noise emissions of similar equipment. Several noise levels in Table 5.21-5 exceed limits in the San Francisco noise ordinance discussed below.

Table 5.21.5
Construction Equipment Noise Emission Levels

Equipment Type	Typical Sound Level at 50 ft (dBA)
Backhoe	85
Bulldozer	85
Compactor	82
Compressor	81
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	85
Crane, Mobile	83
Generator	89
Loader	85
Pavement Breaker	85
Paver	89
Pile Driver, Impact	101
Pump	76
Roller	74
Shovel	82
Truck	88

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[18] *Transit Noise and Vibration Impact Assessment*, Office of Planning, Federal Transit Administration, US Department of Transportation, Report Number DOT-T-95-16 (April 1995).

Construction noise at a given noise-sensitive location depends on the magnitude of noise during each construction phase, the duration of the noise, and the distance from the construction activities. Table 5.21-6 provides noise projections for equipment that is often used during cut-and-cover subway construction.

Table 5.21-6
Typical Equipment List, Subway Excavation

Equipment Item	Typical Sound Level at 50 ft (dBA)	Equipment Utilization Factor (%)	L_{eq} (dBA)
Air Compressor	80	30%	76
Backhoe	80	30%	76
Crane, Derrick	85	30%	76
Dozer	85	40%	81
Generator	80	80%	80
Loader	85	40%	80
Shovel	80	30%	76
Dump Truck	88	10%	78
Total workday Leq at 50 feet (one shift)			88
Equivalent Leq 200 feet from construction site			76

Source: Harris Miller Miller & Hanson

An L_{eq} of 88 dBA for a total construction shift is equivalent to an L_{eq} of approximately 76 dBA at a distance of 200 feet from the construction site, which is much higher than the normal daytime L_{eq} in the project area, even in locations where ambient noise exposure is relatively high because of traffic on I-80.

Article 29, Regulation of Noise, of the San Francisco Police Code includes specific limits on noise from construction. Basic requirements include:

1. Maximum noise level from any piece of powered construction equipment is limited to 80 dBA at 100 ft. This translates to 86 dBA at 50 feet.

2. Impact tools are exempted, although such equipment must have effective mufflers and shields. The noise control equipment on impact tools must be as recommended by the manufacturer and approved by the Director of Public Works.

3. Construction activity is prohibited to between 8 PM and 7 AM if it causes noise that exceeds the ambient noise plus 5 dBA.

Construction of the CalTrain Extension Alternative would be subject to the requirements of this noise ordinance. As the regulations are written, it is almost impossible to perform any significant construction during nighttime hours. The construction noise section of the noise ordinance are enforced by the San Francisco Department of Public Works (DPW), which has some latitude in how the regulations are enforced and may waive some noise requirements to expedite the project or minimize traffic impacts. For example, along Townsend Street where most of the land use is commercial, business owners may prefer nighttime construction, since it would reduce the disruption of normal business activities. DPW waivers usually allow most construction processes to continue until 2 am, although construction processes that involve impacts to a surface are rarely allowed to extend beyond 10 pm. This would include equipment used in demolition such as jackhammers and hoe rams, and pile driving. The contractor would need to work with the DPW to agree upon an acceptable approach, balancing interruption of the business and residential community, traffic disruptions, and reductions in the total duration of the construction.

The construction phases of this project and the potential for noise impacts are summarized below:

Utility Relocation: Relocating the utilities would not have a high potential for noise impacts. The equipment used is typical of ordinary street work. This construction would not normally warrant nighttime construction except in areas where the relocation efforts would cause unacceptable interference with traffic.

Demolition: During demolition of the Transbay Terminal, noise from impact equipment such as jackhammers, pavement breakers, and hoe rams could be disturbing to occupants of buildings near the Transbay Terminal. The land uses closest to the Transbay Terminal are primarily commercial and office space. Impacts on these spaces would be temporary and should not disrupt normal use of the buildings.

The other major demolition effort would be removal of existing bus ramps leading from the Transbay Terminal. Again, the impact equipment used in the demolition is the most likely to cause intrusive noise. Land uses closest to the ramps are primarily commercial and office space. Impacts on these spaces would be temporary, typically a week or two during the period that the closest ramp is demolished, and should not disrupt normal use of the buildings.

Townsend Street Segment

Surface Rail Line & Station Construction: The surface rail line and station construction would primarily affect buildings along Townsend from Seventh Street to the beginning of the retained cut portion at Fifth Street (under the Townsend Center and Townsend-South Side Options). Existing land uses are primarily commercial, industrial, or office space with some mixed-use residential buildings within a block of Townsend Street. Noise from daytime construction could be intrusive on an intermittent basis, however, compliance with the limits of the San Francisco noise regulations should be sufficient to avoid significant noise impacts. A waiver to allow unrestricted nighttime construction could result in noise impacts to mixed-use residential buildings within a block of Townsend.

Midday Storage Yard Construction: There are no noise-sensitive receptors close to the midday storage yard optional locations. Therefore, construction activities for this yard are not projected to cause any noise impacts.

Retained Cut/Portal Construction: The construction of the retained cut and the portal would include drilling a number of auger holes to build the soil-cement walls, excavation between the walls, and construction of the track bed and track. The land uses potentially most affected by the construction (for Townsend Street Center and Townsend Street South options) would be along Townsend Street between Fourth and Fifth Street, which is primarily commercial and industrial with some office space. As for other construction along Townsend, a waiver to allow unrestricted nighttime construction could result in noise impacts to mixed-use residential buildings within a block of Townsend.

Cut-and-Cover Construction: The subway track sections along Townsend Street and Folsom would be cut-and-cover construction. It is anticipated that this construction would last for a total period of approximately 18 months. The noisy phases of cut-and-cover construction are the initial construction of the support walls and installation of the roadway decking. Once the decking is in place, excavation and construction would continue under the decking. During the excavation and bracing phases, above ground activities would consist primarily of cranes for removing excavated material and trucks to haul the excavated material away. Surface activities would not be a major factor for the remainder of cut-and-cover construction, with the exception of street reconstruction at the very end of the project.

Mined Tunnel

Although tunnel mining is underground and does not cause noise impacts, the surface activities associated with mining can cause substantial noise impact. These surface activities are concentrated at the tunnel staging area. Noise impacts from staging areas are discussed below. Although activities within the tunnel would not cause noise impacts, they could result in vibration that is annoying to building occupants or, in severe cases, causes building damage. The mining activities most likely to cause noticeable or damaging vibration are:

- **Blasting**: Limited blasting may be required in areas of the tunnel that encounter very hard sandstone. It is not expected that blasting would be required for more than about 100 feet of the tunnel. Blasting is always done under very controlled conditions because of the potential for damage. The construction specifications would include specific limits for blasting, require monitoring at sensitive buildings during any blasting to verify that the limits are not exceeded, and require use of test charges to verify that the planned blasting would not exceed the vibration limits.

- **Tunnel Excavation**: The process of excavating the material from the tunnel causes vibration that could be felt inside buildings within about 100 feet of the tunnel face. This vibration is usually well below damage thresholds and, because it is perceptible for only a day or two at any specific location, is not usually considered a severe impact.

- **Spoils Removal**: Muck cars operating on rail laid on the tunnel floor are often used to move excavated material from the tunnel face to the access shaft. Although not common, there are case histories where muck train operations have caused vibration that building occupants above the tunnel have found intrusive.

Potential for damaging or intrusive vibration during the tunnel mining processes would be controlled by specific limits and monitoring requirements incorporated into the construction specifications.

Contractor Work Areas: The specific construction activities that would occur at the contractor work areas would vary, depending on their location. However, a considerable amount of heavy equipment would be operating at the site. These sites would be the proposed locations for removal of much of the excavated material from retained cut, cut-and-cover, and mined tunnel construction. Activities would include: temporary muck storage, muck removal, trucks transporting material to the construction site, cranes lowering and lifting materials from the access shafts, heavy equipment such as front end loaders, ready-mix trucks delivering concrete to the job, and tunnel ventilation equipment. The three contractor staging/work areas being considered are:

1. Southwest corner of Fifth and Townsend (for cut-and-cover and retained cut construction on Townsend Street). This site is sufficiently removed from noise sensitive receptors that the contractor should not have any problem complying with the San Francisco noise regulations.

2. North of Folsom Street opposite the northern end of Essex Street (for the cut-and-cover north of Folsom Street) The land use in this area is primarily office and commercial with the closest residential land uses on Rincon Hill overlooking the site. It is expected that the contractor will work with the San Francisco DPW to avoid noise impacts to the closest residences through restrictions on work hours, noise limits on the major noise sources, and possibly localized sound walls to mitigate specific sources. Because the closest residences are 30 to 50 feet higher than the construction site, sound walls to mitigate all sound on the site may not be feasible.

3. Parking lot of 270 Brannan Street (for the mined tunnel). This site is considered optional, but highly desirable. The closest residences are approximately 150 to 200 feet from the site. Based on the preliminary calculation shown in Table 5.21-6, Leq over an 8-hour shift would be approximately 76 dBA at these residences. Approximately 10 to 15 dBA of noise mitigation will be required to meet the nighttime limit in the San Francisco noise regulations of ambient plus 5 dBA. It is estimated that a minimum requirement for nighttime construction

would be construction of a 15- to 20-foot-high sound wall along the southern side of the construction site.

A particular concern at this site could be backup alarms during nighttime hours. Because backup alarms are designed to get people's attention, the sound can be very noticeable even though their sound level does not exceed the ambient; it is common for backup alarms at construction sites to be major sources of noise complaints. A common approach to minimizing the use of backup alarms is to design the construction site with a circular flow pattern that minimizes backing up of trucks and other heavy equipment. Another approach to reducing the intrusion of backup alarms is to require all equipment on the site to be equipped with ambient sensitive alarms. With this type of alarm, the alarm sound is automatically adjusted based on the ambient noise. In nighttime hours when ambient noise is low, the backup alarm is adjusted down.

Haul Routes: Deliveries to the construction sites and excavated material from the project would be moved along pre-selected haul routes. Most of the routes are along relatively busy streets with primarily commercial and industrial land uses. There is some intermixed office space and residential land uses along several of the planned haul routes. Because the daytime traffic on the haul routes is relatively heavy, it is not anticipated that the increase in daytime traffic would cause adverse impacts. However, nighttime hauling of excavated materials could be the source of noise impacts in the following areas: 4th Street, one block on Howard Street, and Brannan Street near 4th Street.

5.21.10 Water Resources

Impacts

Construction grading, tunneling, and utility excavations would increase the sediment load to storm sewers during rainfall events. Sediment sources created during construction include: soil stockpiles; soil tracked across construction areas, staging areas, and public roads; and soil transported to these areas by wind. Because stormwater in the study area discharges to the City's combined storm/sanitary sewer system, sediment transported by stormwater would not affect surface water bodies in the project area (China Basin and San Francisco Bay). However, wind-transported soils could contain contaminants that would affect nearby surface waters.

Construction dewatering would locally result in the temporary lowering of the water table and could promote the downward migration of contaminants from the uppermost groundwater zone to deeper groundwater zones. If dewatering-related water table lowering affects areas where free-phase petroleum hydrocarbons are floating on the water table, the resulting decrease in the water-table elevation would smear the hydrocarbons across soils that otherwise may be only minimally affected. The impacts associated with handling and disposal of contaminated dewatering effluent are further discussed in Section 5.21.14.

Mitigation Measures

Construction excavation spoils will be appropriately managed so as to minimize wind dispersion of potentially contaminated soil particles. Spoils management practices are to include covering stockpiles with plastic sheeting, periodically spraying water on exposed soil areas to suppress dust generation, and decontamination of vehicles prior to departure from construction and staging areas.

As discussed in Section 5.21.14, construction dewatering would be performed in stages in order to minimize downward migration of contaminants in shallow groundwater. Dewatering effluent will be discharged to the sanitary sewer and, therefore, would not affect nearby surface waters.

Chemical test results for groundwater samples along the alignment would be used to obtain a batch discharge permit from the San Francisco Department of Public Works and to evaluate requirements for treatment prior to discharge to the sanitary sewer. Effluent produced during the dewatering of excavations would be collected in onsite storage tanks and periodically screened for potential contamination to confirm the need for treatment prior to discharge. If necessary, treatment may include:

- Allowing sediment to settle out of the effluent in order to reduce elevated metals concentrations that can result from high quantities of suspended sediment; and/or

- Carbon filtering to remove fuel hydrocarbons and PAHs.

5.21.11 Utilities

Impacts to utilities are primarily considered to be long-term since their relocation would be long term. These impacts are discussed in Section 5.12. Necessary disruptions to service during construction would be short-term and carefully scheduled with advance notice given to affected customers.

5.21.12 Electromagnetic Fields

There would be no electromagnetic field impacts associated with construction of the CalTrain Extension Alternative.

5.21.13 Historical and Cultural Resources

Archaeological Resources

Potential long-term impacts to archaeological resources within the project APE -- including measures to be taken in the event of unanticipated discoveries during construction -- are discussed in Section 5.14. No additional impacts to archaeological resources are anticipated from CalTrain Extension Alternative construction activities.

Historical Architectural Resources

Construction of the CalTrain Extension Alternative would involve tunneling under the Rincon Point/South Beach Historic Warehouse-Industrial District. Mined tunnel construction was selected for this segment of the alignment in order to avoid direct impacts to the Historic District, and three alternative mined tunnel alignments were evaluated to identify a feasible alignment that would minimize potential impacts to structures at the surface, including historic resources.

Table 5.21-7 lists the NRHP-eligible properties that would potentially be affected under each mined tunnel option. Figure 5.21-2a shows their location and the boundaries of the historic district in relation to the mined tunnel alignment options. Figure 5.21-2b provides a brief description of these resources.

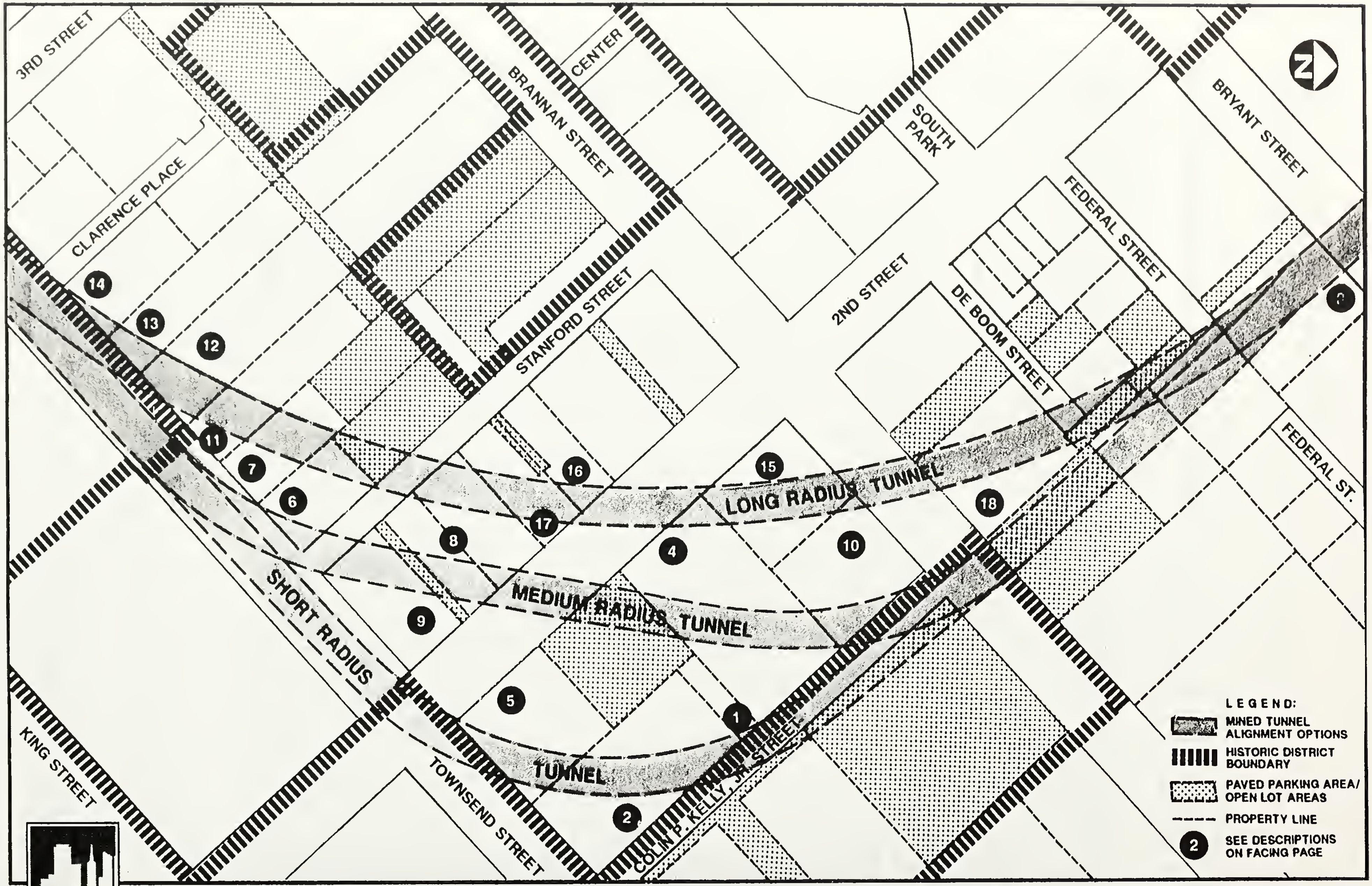
The short-radius curve/long mined tunnel option profile would be approximately 40 to 60 feet below the building foundations. This option would tunnel under the fewest (four) NRHP-eligible properties; one property is individually listed and two are 19th century buildings. The medium-radius curve/medium mined tunnel option profile would be at a similar depth and would tunnel under seven NRHP-eligible properties; three are individually listed and none dates from the 19th century. The long-radius/short mined tunnel option profile would also be 40 to 60 feet below the building foundations. It would tunnel under 14 NRHP-eligible properties, of which two are individually listed and one dates from the 19th century. On balance, it appears that the short-radius curve alignment, although it results in the longest tunnel, poses the least potential impact to historic and other structures and to the Rincon Point/South Beach Historic Warehouse-Industrial District.

Given the depth of tunneling, damage to the historic properties is not anticipated, but the JPB proposes to employ various additional measures to be taken prior to and during mined tunneling activities to provide additional protection to the buildings. An underpinning process is recommended for control of surface structural subsidence during construction. This process as described in Section 5.20 of this document, may result in the physical alteration of the historic buildings during the construction phase of the project, but this alteration would be temporary. On completion of construction, any space created around the buildings for control jacking would be grouted. Any cosmetic damage to historic properties would be repaired using approaches consistent with the Secretary of Interior's Standards (NPS, 1992), and the integrity of the property would be maintained. These measures would be incorporated into the project.

As described in Section 5.14, implementation of the CalTrain Extension to the Transbay Terminal Site Alternative would require demolition of the present Transbay Terminal and its adjoining ramps, both contributory elements of the Bay Bridge, a NRHP-eligible property.

Table 5.21-7
NRHP-Eligible Properties in South End Historic District Potentially Affected by Tunnel Mining Activities, by Alignment Option

Short-Radius Curve	Map #	Medium-Radius Curve	Map #	Long-Radius Curve	Map #
California Warehouse 675 Second Street - 1S	5	Clinton Fireproofing 136 Townsend Street - 3D	7	California Electric Light 178 Townsend Street - 3D	14
Hoopers South End Warehouse 62 Colin P. Kelly Street - 3D 64-72 Townsend Street	2	Zytron 130 Townsend Street - 3D	6	L.A. Norris Co. 162 Townsend Street - 3D	13
B&W Engraving Co 52 Colin P. Kelly - 3D	1	SFFD Pump Station 698 Second Street - 1S, 3D	9	Winchester Simmons 148 Townsend Street - 3D	12
G.E. Warehouse 355 Bryant Street - 3D	3	Moore and Scott Building 670-80 Second Street - 3D	8	Clinton Construction Co. 144 Townsend Street - 3D	11
		South End Warehouse 625 Second Street - 1S	4	Clinton Fireproofing Co. 136 Townsend Street - 3D	7
		Rosenberg Bros. Warehouse 275 Brannan Street - 1S	10	Zytron 130 Townsend Street - 3D	6
		G.E. Warehouse 355 Bryant Street - 3D	3	Moore & Scott Building 670-80 Second Street - 3D	8
				B.F. Goodrich Rubber Co. 650 Second Street - 3D	17
				640 Second Street - 3D	16
				South End Warehouse 625 Second Street - 1S	4
				Felton Co/Haslett Warehouse 601-15 Second Street - 3D	15
				Rosenberg Bros. Warehouse 275 Brannan Street - 1S	10
				Hawley Terminal 274 Brannan Street - 3D	18
				G.E. Warehouse 355 Bryant Street - 3D	3



3RD STREET
CLARENCE PLACE
BRANNAN STREET
CENTER
SOUTH PARK
BRYANT STREET
FEDERAL STREET
2ND STREET
DE BOOM STREET
STANFORD STREET
FEDERAL ST.
KING STREET
TOWNSEND STREET
COLIN P. KELLY, JR. STREET
LONG RADIUS TUNNEL
MEDIUM RADIUS TUNNEL
SHORT RADIUS
TUNNEL
N
1
2
4
5
6
7
8
9
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11
12
13
14
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16
17
18
LEGEND:
MINED TUNNEL ALIGNMENT OPTIONS
HISTORIC DISTRICT BOUNDARY
PAVED PARKING AREA/ OPEN LOT AREAS
PROPERTY LINE
2 SEE DESCRIPTIONS ON FACING PAGE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

POTENTIAL CONSTRUCTION PHASE IMPACTS ON HISTORIC STRUCTURES

Figure 5.21-2a

Rincon Point/South Beach Historic Warehouse-Industrial District. This historic district comprising over five city blocks and over 60 individual properties, lies partially within the APE for the CalTrain Extension Project. It was determined eligible for the NRHP (Caltrans, 1983) under Criteria A, B, C and D, for its association with the development of the Port of San Francisco; the economic and social history of the City, including mining, industry, and Chinese immigration; the development of the waterfront and the South of Market District; and the history of warehouse design and construction. Its period of significance is from the late 1850s to about 1915. The district was also designated by the San Francisco Board of Supervisors in 1990 as an historic district with slightly different boundaries and a different name, with a "period of historical significance, 1867 to 1935, [which] comprises the era during which the waterfront was a vital part of the City's and the Nation's maritime commerce." According to Appendix I to Article 10 of the City Planning Code, the district is "an important visual landmark for the city as a whole. The large number of intact masonry warehouses which remain to this day are reminders of the maritime and rail activities which helped to make San Francisco a great turn-of-the-century port city." Most of the properties within the district are currently within private ownership.

Each of the following properties potentially affected by CalTrain project construction is considered eligible for the NRHP as a contributor to the historic district.

1. **52 Colin P. Kelly Street.** This three-story brick masonry building was built in 1907.

2. **Hooper's South End Grain Warehouse, 62 Colin P. Kelly Street,** is one of the last 19th Century warehouses in San Francisco. It was built in 1874 by John Hooper and owned by South End Warehouse Company, formed in 1902, which grew to become one of San Francisco's two largest warehouse companies. By 1913, the Townsend Street side of this building housed a saloon, restaurant, and storage area; Bouncer's Bar, closed in 1991, had been in the building since 1910. The rest of the building has been used as warehouse space to the present.

3. **G.E. Warehouse, 355 Bryant Street.** This four-story brick masonry warehouse was designed in 1916 for the General Electric Company. It was converted to residential units in 1989, in a renovation which retained the original interior and exterior finishes.

4. **South End Warehouse, 625-35 Second Street.** The South End Warehouse, a four-story brick masonry warehouse built in 1905, was individually listed in the NRHP in 1982 as a result of a study for the San Francisco Redevelopment Agency.

5. **California Warehouse, 699 Second Street.** This two-story brick masonry building was built in 1882 and was individually listed in the NRHP in 1982 as a result of the Redevelopment Agency study. It is also considered a contributive element to Historic District.

6. **130 Townsend Street.** This building was built ca. 1895-96 and was first occupied by Stevens, Arnhold and Co., agents for Inglenook Vineyard. By 1906, the property was owned by Gustave Niebaum of the Alaska Commercial Company, but the original tenants remained until the 1920s.

7. **Clinton Fireproofing, 136 Townsend Street.** This building was designed in 1913 by engineer R.V. Woods for L.A. Norris of the Clinton Fireproofing Company and was originally used for wire and iron storage.

8. **Moore & Scott Building, 670-80 Second Street.** This building was designed by engineer Leland S. Rosener in 1913 for Moore and Scott Iron Works as a casting, forging, machine shop, and boiler works. This company was an important ship builder in World War I under the name Moore Shipbuilding & Dock Company.

9. **San Francisco Fire Department Pumping Station Number One, 698 Second Street.** This building was built in 1910-1911 and was individually listed on the NRHP in 1982 as a result of a study by the San Francisco Redevelopment Agency.

10. **Rosenberg Brothers Dried Fruit Warehouse, 275 Brannan Street.** The Rosenberg Brothers Dried Fruit Warehouse was built in 1904. It was determined individually eligible for the NRHP as a result of the San Francisco Redevelopment Agency study in 1982.

11. **144 Townsend Street.** This three-story, reinforced concrete warehouse with decorated facade was designed in 1922 by architect H. C. Baumann for the Clinton Construction Company (L.A. Norris, owner). It was used for the storage of wholesale wire.

12. **Winchester-Simmons Company, 148 Townsend Street.** A three-story, reinforced concrete warehouse in Mediterranean style, this building was designed by H.C. Baumann and Edward Jose in 1922 for the Winchester-Simmons Company, wholesale dealers in hardware, guns, and ammunition. By 1950, the building was occupied by Western Asbestos Company.

13. **162 Townsend Street.** This two-story reinforced concrete warehouse building was designed by architect H.C. Baumann in 1919 for L.A. Norris Company and was built by Clinton Construction Company.

14. **California Electric Light Company, 178 Townsend Street.** This building was designed by Percy and Hamilton in 1888 for the California Electric Light Company, which may have been the first electric power company in the State. By 1894, ownership was held by the Edison Light & Power Company, and by 1901, it had passed to the San Francisco Gas and Electric Company. From 1908 to 1929, the building was used for storage.

15. **Felton Co./Haslett Warehouse, 601-15 Second Street.** This six story and basement warehouse building of brick masonry was designed in 1909 by architect Will D. Shea for Senator Charles N. Felton to be occupied by D.N.& E. Walter Company for a wholesale furniture operation; the retail store was at Stockton and O'Farrell Streets. The building was designed to incorporate a rail spur.

16. **640 Second Street.** A three story reinforced concrete warehouse, this building was designed by architect H.C. Baumann in 1925 for L.A. Norris and was first occupied by the United States Radiator Corporation.

17. **650 Second Street.** A six-story reinforced concrete office and warehouse with a Spanish tiled parapet, this building was designed by Baumann & Jose, architects for J. Sheldon Potter, and was first occupied by the B. F. Goodrich Rubber Company. In 1934, the building was altered on the inside for use as a bottling plant. Hermann Baumann designed two other district buildings that are in the APE for the present project.

18. **Hawley Terminal, 274 Brannan Street.** A six story industrial structure of reinforced concrete construction, this building was built ca. 1920 (Snyder, 1983), by M.J. Hawley and Harrison S. Robinson, a prominent developer and political figure. It was financed by Strauss bonds, an innovation at the time.

POTENTIAL CONSTRUCTION PHASE IMPACTS ON HISTORIC STRUCTURES

Figure 5.21-2b

No other historic properties identified within the project APE are anticipated to be directly or indirectly affected by construction activities for the CalTrain Extension Alternative.

Mitigation

In addition to the construction techniques designed to avoid damage during construction, the following techniques are proposed to mitigate potential effects on the historic properties from construction: (1) assessment of the current structural condition of the buildings prior to construction in reports to be prepared by a qualified structural engineer; (2) opportunity for SHPO to review and comment on the structural engineering report within 30 days of receipt; and (3) if damage occurs during or as a result of construction, JPB would notify the SHPO immediately to afford the opportunity for consultation on corrective action or further recommendations. Any repair undertaken for structural or cosmetic damage from construction would be performed in accordance with the Secretary of Interior's Standards for Treatment of Historic Properties in order to avoid adverse impact to the integrity of the resources. These measures would be set forth in a Memorandum of Agreement (MOA) to be executed by the Advisory Council on Historic Preservation (ACHP), FTA, Caltrans, JPB, and SHPO, if appropriate.

5.21.14 Hazardous Materials Impacts on Project Construction

There are two types of hazardous materials that may cause construction impacts: those used in the construction process and those that would be encountered during construction.

Some hazardous materials, primarily fuels and motor oils, would be used during construction. Construction of aboveground facilities would also use paints. While these are commonly used materials, they are considered hazardous (fuels, for example, are flammable) and improper handling could endanger workers and the public and also could result in contamination of soil and/or water.

Contact with contaminants in the study area could have potentially adverse effects on worker, public, and environmental health and safety. During project construction, workers could be exposed to soil and groundwater containing hazardous substances via direct contact with contaminated soil and groundwater or via airborne pathways. The public and environment could be exposed to contaminants transported offsite during construction. The degree of hazard associated with these impacts on human or environmental receptors would be a function of the chemical properties, concentrations and volume of contaminants, nature and duration of construction activities, and contaminant migration pathways.

Construction activities such as excavation, installation of deep foundations, or site dewatering within existing contaminated areas could increase the spread of contaminants to surface water and other groundwater zones in the study area. Disposal of contaminated soil would transport contaminants out of the study area as well.

As noted in Chapter 4, Section 4.17, seventeen regulatory agency lists were searched to identify listed facilities within the project area. For purposes of this analysis, the 38 identified hazardous materials sites in the study area have been classified into three categories:

- Locations that would be directly affected by construction along the proposed extension alignments;
- Locations adjacent to or near the proposed extension alignments that could be affected by project construction or that could provide sources of contaminants to the construction areas; and
- Properties with essentially no anticipated adverse impacts due to the distance from the proposed construction areas and nature of contamination.

Table 5.21-8 presents a breakdown of the identified sites into these categories.

The following three sections (for the Townsend Street, Mined Tunnel, and Folsom to the Transbay Terminal Segments) provide a detailed discussion of hazardous materials sites that could affect construction activities.

Townsend Segment

Storage Yards and Surface Tracks. Most of the identified hazardous materials sites located near the proposed storage yard sites and surface tracks are included on agency lists because of releases from underground storage tanks (USTs). According to the agencies' information, the types of petroleum hydrocarbons that have been released from USTs near the proposed storage yards and surface tracks include diesel fuel, gasoline, waste oil, kerosene, and mineral spirits.

Construction of the storage yard and surface tracks and trenching for utilities would result in disturbance of surface soils. None of the excavations is expected to be deep enough to encounter groundwater. Therefore, impacts to construction of the storage yard and surface tracks from UST releases would be limited to spoils handling and health and safety precautions for hydrocarbon-contaminated soil.

Because of their close proximity to the planned alignment, the following sites have the greatest likelihood to affect storage yard and track construction:

- Southern Pacific Transportation, 329 Townsend Street, Site 29
- Flair Electro Sales, 516 Townsend Street, Site 34

Table 5.21-8
Classification of the Potential Hazards Associated with Hazardous Materials Sites

Site No.[1]	Site Name and Location	Potential Construction-Related Hazard		
		None [2]	Indirect [3]	Direct [4]
1	Federal Reserve Bank, SE Corner of Mission and Main Streets		X	
2	Talco Inc., 621 1st Street		X	
3	301 Howard Street Assoc., NE Corner of Howard & Beale Sts.		X [5]	X [5]
3	300 Howard St., 300 to 342 Howard Street		X	
3	San Francisco Gas Light Co., 401 Howard Street			X [6]
6	Caltrans (Transbay Terminal), 150 1st Street			X
7	San Francisco Gas Light Co., 166 Fremont Street, 498 Howard St.			X
3	US EPA, 215 Fremont Street	X		
6	Graphic Arts Engraving Co., 35 Natoma Street	X		
16	Dahl Beck Electric Co., 580 Howard Street		X	
16	Unocal #1856 (Former), 401 Harrison Street		X	
16	Unocal, 390 1st Street	X		
13	Bayside Village, 1st Street/ Bryant Street		X	
16	Unknown, 101 Brannan Street	X		
16	Oriental Warehouse, First and Brannan Streets		X	
16	S. F. Redevelopment Agency - Site K, Townsend Street	X		
17	Unknown, Second and Townsend Streets		X	
16	PG&E Gas Plant, King and 2nd Streets		X	
16	San Francisco Fire Dept., 698 2nd Street		X	
29	San Francisco Gas & Electric Co., 120 King Street		X	
21	Pacific Gas Improvement Co., 169 Townsend Street		X	
22	Sun Chemical Corporation #1, 252 Townsend Street			X
23	Unspecified (Embarcadero Roadway Project)		X	
24	San Francisco Iron Foundry, 260 Townsend Street			X
25	Heublin, Inc., 601 4th Street		X	
29	China Basin Building, 185 Berry Street		X	
29	Serramonte Ford, 530 Brannan Street		X	
29	San Pacific Imports, 542 Brannan Street		X	
29	Southern Pacific Transportation, 329 Townsend Street			X
30	Fleet Maintenance, 590 Brannan Street		X	
31	Unspecified (Embarcadero Roadway Project)		X	
32	Unspecified (Embarcadero Roadway Project)		X	
33	California Poultry Company, 777 Brannan Street		X	
34	Flair Electro Sales, 516 Townsend Street,			X
35	Baker/ Hamilton Building, 638 King Street		X	
36	Greyhound, Hooper/ 7th Street		X	
37	Chevron, 1200 7th Street		X	
38	The Glidden Company, 1400 7th Street		X	

Notes:

[1] Site Numbers correspond to site location numbers shown on Figure 4.17-1.

[2] Sources of potential contamination are judged to be sufficiently far from proposed construction activities that environmental impacts are not anticipated.

[3] Properties adjacent to proposed construction areas or properties where the presence of potential sources is not well-defined relative to planned construction.

[4] Properties where proposed construction may pass directly through areas of known contamination.

[5] Potential "direct" construction-related hazard only to mitigation options for removal of Transbay Terminal. Potential "indirect" hazard for underground station.

[6] Contamination may extend beyond site boundaries into areas that would be directly affected by construction.

Source: Dames & Moore, 1996

Although the Chevron facility at 1200 7th Street (Site 37) is near the I-280 and 16th Street storage yard site option, the agencies' information indicates that either no remedial action was deemed necessary or that sufficient remedial actions have been completed.

In addition to UST-related hydrocarbons, other potentially hazardous constituents that may affect yard and surface track construction include metals (primarily lead), PAHs, and solvents. PAHs and elevated concentrations of lead were detected during Embarcadero roadway-related investigations and construction along King Street (Sites 23, 31, and 32). Furthermore, lead contamination is prevalent in fill material in the South-of-Market area and should be expected in fill disturbed by yard and track construction. Although coal tar has not been specifically identified in the storage yard and surface track area, PAHs associated with coal tar residues and other past land uses are likely to be encountered in the fill.

Townsend Street Center and South Side Alignment Options. Two identified sites, Sun Chemical Corporation #1 (Site 22) and the San Francisco Iron Foundry (Site 24), lie in or adjacent to the southern cut-and-cover subway section for the Townsend Street Center and South Side Alignment Options. The Sun Chemical Corporation site is listed as requiring no further action by the California Department of Toxic Substances Control (DTSC). No information was available in the agencies' databases regarding the nature of contamination, if any, at the San Francisco Iron Foundry site. However, based on the type of industry implied by the site name, it is reasonable to expect that soils at that site may contain elevated metals concentrations. No other identified hazardous materials sites located near the Townsend Street cut-and-cover tunnel section are expected to have affected soil that would be disturbed during construction of the Townsend Street Center or South Side Alignment Options.

Several identified UST release locations (Sites 25, 27, 28 and 30) may be located hydrogeologically upgradient of the cut-and-cover tunnel section and, therefore, groundwater affected by fuel hydrocarbons may be encountered during construction dewatering.

If the foundation excavation for the surface station along Townsend Street between Fifth and Sixth Streets is sufficiently deep, groundwater contaminated with petroleum hydrocarbons may be encountered. The most substantial UST release site near the proposed station is Fleet Maintenance (Site 30), which reportedly has gasoline product floating on the water table. Depending on the lateral extent of the floating product, dissolved-phase gasoline constituents, and groundwater flow direction, gasoline hydrocarbons from this site could affect construction dewatering and worker health and safety. As with the surface tracks, construction of the surface station would require disturbance of fill that potentially contains lead and PAHs.

Townsend Street South/Subway Option.. The subway portion of the Townsend Street South/ Subway Alignment Option potentially intersects up to two more identified hazardous materials sites (Sites 29 and 34) than the subway portions of the Townsend Center or South Side Options.

Potential impacts associated with sites 29 and 34 are similar to those discussed above for the storage yard and surface tracks, with the following exceptions:

- Soil disposal costs may be increased due to the large quantity of soils that would be excavated during cut-and-cover construction; and

- The subway excavation would require dewatering of groundwater potentially contaminated by fuel hydrocarbon constituents.

Of most importance with respect to dewatering is the Fleet Maintenance UST release site (Site 30), at which gasoline product floating on the water table has been reported. Depending on the lateral extent of floating product, dissolved-phase gasoline constituents, and groundwater flow direction, gasoline hydrocarbons from this site could affect construction dewatering and worker health and safety.

Construction of the cut-and-cover subway would require disturbance of fill that potentially contains lead and PAHs in addition to fuel hydrocarbons, as is the case with other components of the surface track, storage yard, and Townsend Street alignment options.

Mined Tunnel Segment

The mined tunnel would extend through bedrock and would be below the current groundwater table over the entire alignment. Because fuel hydrocarbons associated with UST sites have a tendency to float on the groundwater table, it is unlikely that hydrocarbon-affected bedrock would be encountered. Therefore, impacts from potential UST release sites would be limited to contaminated groundwater or floating product that could enter the tunnel excavation or require special disposal when intercepted by the tunnel dewatering system. Entry of dissolved-phase or free-phase fuel hydrocarbons into the tunnel could create explosion or inhalation hazards. If present in the dewatering system effluent, fuel hydrocarbons may prevent direct discharge of the effluent to the sanitary sewer.

With two exceptions, the identified UST release sites near the mined-tunnel section (Sites 11, 12, 14, 19, 25, and 26) are either unconfirmed releases or listed as requiring no further remedial action. The Unocal facility at 401 Harrison Street (Site 11) has reportedly excavated soil in response to a waste-oil release. No information regarding impacts to groundwater was included in the agency listing. Floating product is reportedly present at the Bayside Village site (Site 13), which is approximately 600 feet from the tunnel alignment.

Metals and PAHs have been detected at several sites in the vicinity of the mined-tunnel alignment (Sites 15, 16, 17, 18, 20, 21, and 24). These contaminants are encountered in fill material and, to a limited extent, may extend down into underlying native soils but are not expected to be present in bedrock. In addition, low concentrations of metals and PAHs may be present in groundwater intercepted by the tunnel dewatering system. Except where vertical shaft(s) are installed to facilitate tunneling, contamination in soil would not affect the mined tunnel. Soils overlying bedrock in the shaft location(s) may contain metals, PAHs, and/or fuel hydrocarbons at sufficient concentrations to require worker health and safety precautions and special handling and disposal of excavated soil.

Folsom to Transbay Terminal Segment

Only two of the identified hazardous materials sites are located near the cut-and-cover subway segment north of Folsom Street to the proposed underground terminal. The first site, Graphic Arts Engraving Company (Site 9), is listed on the agencies' databases as a small quantity generator of hazardous wastes. There is no indication that hazardous materials have been released to soil and groundwater at that facility. The second site, Dahl Beck Electric Company (Site 10), is reported as having an unconfirmed gasoline release to soil.

This cut-and-cover section is located outside of known areas of coal tar residues, but may still have been affected by low concentrations of PAHs. Similarly, this subway section is not included within the Article 20[19] zone but may encounter fill soils that contain elevated concentrations of lead or other metals.

Three UST release sites located near this cut-and cover section were identified in the agency lists, indicating there is a potential that subway construction would encounter groundwater containing fuel hydrocarbons. The identified UST release sites include the Federal Reserve Bank (Site 1), Talco Inc. (Site 2), and the Caltrans (Transbay Terminal) site (Site 6). Details regarding the nature of contamination at these sites are discussed below, with contamination from UST releases for all three sites discussed first, followed by specifics related to the presence of asbestos at the Transbay Terminal iteself.

Construction of the new CalTrain underground terminal would require excavating potentially contaminated soils and dewatering of groundwater that may include hazardous contaminants. A portion of the underground terminal is located within the Article 20 zone, indicating that soils encountered during construction are likely to have elevated concentrations of lead and other metals. In addition, coal tar deposits are likely to be encountered in the eastern half of the terminal excavation while surrounding soils are expected to contain PAHs associated with coal tar residues. The underground terminal would be located adjacent to a former coal gas plant, the San Francisco Gas Light Company (Sites 5 and 7). Elevated levels of PAHs in soil have been detected at several nearby sites, including the 301 Howard Street (Site 3) and 300 Howard Street (Site 4).

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[19] Article 20 of the San Francisco Public Works Code (Maher Ordinance).

Two identified hazardous materials sites are located at the proposed underground terminal site. The Caltrans (Transbay Terminal) site (Site 6) is identified in the agencies' databases as having a suspected hydrocarbon release from an on-site UST. The release was unconfirmed and the available information did not indicate what resources were affected or what remedial actions had been taken. The Graphics Arts Engraving Co. (Site 9) is listed in the agencies' lists as a small quantity generator of hazardous wastes. There is no indication that hazardous materials have been released to soil and/or groundwater at that facility.

The U.S. EPA site at 215 Fremont Street (Site 8) is identified in the EPA data as being involved with the production of pesticides and toxic substances. There is no indication of releases from this facility. Based on the distance separating the USEPA site from the underground terminal, it is unlikely that releases from this facility have contaminated soils that would be encountered during construction of the station.

In addition, there are two UST sites near the proposed underground terminal that have the potential to affect construction of the station. One site, Talco Inc. (Site 2), is approximately 300 feet from the underground terminal and reportedly had a diesel release from a UST that affected soil. According to the agencies' information, groundwater was not affected and no remedial actions were taken. Another site, the Federal Reserve Bank (Site 1), is located approximately 400 feet from the proposed underground terminal and is reported to have had an unconfirmed release of waste oil that affected groundwater.

Based on the presence of UST releases at and near the proposed terminal, and on the probability that other unreported UST releases have occurred in the area, it is likely that some soils encountered during construction would have detectable concentrations of fuel hydrocarbons. Depending on the lateral extent of dissolved-phase gasoline constituents and groundwater flow direction during dewatering, gasoline hydrocarbons from past UST releases could affect construction dewatering and worker health and safety. If present in the dewatering system effluent, fuel hydrocarbons may prevent direct discharge of the effluent to the sanitary sewer

Asbestos-containing Building Materials at the Transbay Terminal Building. An asbestos survey of the Transbay Terminal was performed by Caltrans in 1986 that identified asbestos-containing building materials (ACBM) including domestic water and heating pipe insulation, mechanical equipment insulation, and floor tiles. As part of its 1993 renovation of the terminal building, Caltrans removed asbestos-containing thermal systems insulation, vinyl floor tile and mastic, and transite ducting from various areas of the terminal. Also in 1993, the reinforced concrete roof of the terminal was replaced with a lightweight metal roof. This replacement included removal of approximately 100,000 square feet of built-up asphalt and gravel roofing, vent pipes, and cold joint fillers, all of which were reported to contain asbestos.

Based on this information, some of all of the identified ACBM has been removed from the Transbay Terminal. The presence of additional ACBM cannot be ruled out without additional survey. Demolition of the terminal without prior abatement of ACBM could result in exposure of construction workers and the general public to asbestos fibers.

Mitigation Measures

Handling and storage of fuels and other flammable materials during construction would follow California OSHA standards for fire protection and prevention. These measures include appropriate storage of flammable liquids and prohibition of open flames within 50 feet of flammable storage areas.

Prior to construction, the potential presence of contaminants in soil and groundwater would be investigated using conventional drilling, sampling, and chemical test methods. Based on the chemical test results, a mitigation plan would be developed to establish guidelines for the disposal of contaminated soil and discharge of contaminated dewatering effluent, and to address potential human health and safety issues that may arise as a result of contact with contaminated soil or groundwater during construction. The investigation and mitigation plan would follow the requirements of Article 20.

Soils removed during excavation and grading would be stockpiled, sampled as necessary to meet landfill acceptance criteria, and disposed of offsite at an appropriate landfill or recycling facility. Contaminated soil that remains onsite for an extended period of time would be covered with plastic sheeting to prevent the migration of airborne contaminants offsite. Also, dust control measures would be implemented during construction grading and excavation as necessary to minimize offsite migration of contaminants. Removed soil would be transported by licensed waste haulers under state manifests or bills of lading, as required.

Chemical test results for groundwater samples along the alignment would be used to obtain a batch discharge permit from the San Francisco Department of Public Works and to evaluate requirements for treatment prior to discharge to the sanitary sewer. Effluent produced during the dewatering of excavations would be collected in onsite storage tanks and periodically screened for potential contamination to confirm the need for treatment prior to discharge. If necessary, treatment may include:

- Allowing sediment to settle out of the effluent in order to reduce elevated metals concentrations that can result from high quantities of suspended sediment; and/or

- Carbon filtering to remove fuel hydrocarbons and PAHs.

Dewatering systems would be designed to minimize downward migration of contaminants that can result from lowering the water table surface. As necessary, shallow soils with detected contamination would be dewatered first using wells screened only in those soils. Dewatering of deeper soils would then be performed using wells screened only in the zone to be dewatered.

Dewatering wells would be installed using drilling methods that prohibit shallow contaminated soils from being carried deeper into the boreholes.

Workers performing activities on site that may involve contact with contaminated soil or groundwater would be required to have appropriate health and safety training in accordance with 29 CFR 1910.120. A Worker Health and Safety Plan would be developed for the project by a Certified Industrial Hygienist who would also monitor the implementation of the plan on a day-to-day basis. The Health and Safety Plan would include provisions for:

- Conducting preliminary site investigations and analysis of potential job hazards;
- Personnel protective equipment;
- Safe work practices;
- Site control;
- Exposure monitoring;
- Decontamination procedures; and
- Emergency response actions.

The plan would specify mitigation of potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan will also specify mitigation of worker and environmental exposure to contaminant migration via surface water runoff pathways by implementation of comprehensive measures to control drainage from excavations and saturated materials excavated during construction.

Mitigation measures for asbestos-containing building materials would include identification of all available asbestos survey and abatement reports and supplemental asbestos surveys, as warranted. Identified ACBM would be abated prior to building demolition. Removal and disposal of ACBM would be performed in accordance with applicable local, State, and federal regulations.

5.21.15 Aesthetics & Visual Impacts

As described in Section 5.20, project construction would be multi-phased and would occur in different locations at different times. Wherever and whenever construction occurs, construction equipment and supplies would be visible, and evidence of construction activity would be noticeable to area residents, employees, and visitors. Short term visual changes as a result of construction activities are a common and accepted feature of the urban environment, and generally mitigation is not required.

Nonetheless, the JPB would require the project contractor to ensure that construction crews working at night direct any artificial lighting onto the work site in order to minimize "spill over" light or glare effects on adjacent areas. The JPB, through its on-site field office, would make all efforts possible to minimize specific aesthetic and visual effects of construction identified by neighborhood businesses and residents.

5.21.16 Geologic Impacts on Project Construction

The primary geologic units that could adversely affect construction activities of the proposed CalTrain Extension project include artificial fill and bedrock. Impacts associated with these units are discussed in the following sections.

Fill. Fill soils possess adverse characteristics such as rubble, heterogeneity of composition and depth, and locally high permeability. Because of localized areas of high permeability, fill soils may be difficult to dewater during construction of tunnels and building foundations. Dewatering requirements affect the cost of constructing tunnels and the underground station by increasing the cost to (1) install and operate dewatering systems for the tunnel and station excavations and (2) discharge the dewatering effluent if the water contains contaminants such as metals or petroleum hydrocarbons. The impacts associated with handling and disposal of contaminated dewatering effluent are further discussed in Section 5.21.14.

Bedrock. Impacts to the Build Alternative from poor quality bedrock would be limited to the mined tunnel section that passes through Rincon Hill. For a discussion of mined-tunneling technique proposed for the CalTrain Extension Alternative, see Section 5.20.3.

5.21.17 Safety and Security

Evaluation of long-term project impacts on public safety and security is presented in Section 5.17. This section focuses only on the short-term safety and security impacts of construction activities.

Best construction management practices would be required to be in place to ensure the safety of construction workers, local residents, and employees during project construction. Fencing and lighting of construction and staging areas, and recognized safety practice requirements for the use of heavy equipment and the movement of construction materials would be implemented to avoid accidents. During construction, the Construction Manager would be responsible for job site safety and security. Emergency response personnel within San Francisco would be available for immediate response on an as-needed basis.

CHAPTER 6: EVALUATION OF REPLACEMENT OPTIONS FOR REMOVAL OF TRANSBAY BUS TERMINAL

Information relating to mitigation for displacement of the present Transbay Terminal -- including description and configuration of replacement facilities, specific operator needs accommodated, and long-term and construction phase impacts -- is presented in this chapter.

6.1 INTRODUCTION

6.1.1 Genesis of the Replacement Alternatives

The need for consensus in alternative modification or replacement strategies for the Transbay Terminal exists even without the proposed CalTrain Extension project. The present Transbay Terminal building, which extends across both Fremont and First Streets, the related loading areas in the "hump" and crescent areas above and fronting on Mission Street, and the loop ramps connecting to the Bay Bridge occupy a large site. Much of this area is underutilized, which has sparked interest in developing a more efficient transportation facility that would free up land for other uses. In addition, the present terminal building does not meet current building or seismic safety codes, and the 1989 Loma Prieta earthquake raised seismic safety concerns about the terminal. Moreover, the access ramps to and from the Bay Bridge to the terminal have been determined by Caltrans to be seismically deficient and in need of repair or replacement.

As the owner and operator of the Transbay Terminal, Caltrans confronted the need for seismic retrofit of the terminal. In November 1992, Caltrans and the Office of the State Architect released alternative designs for improvements to the existing terminal. In December 1992, the City of San Francisco and Caltrans agreed to reconsider improvement plans for the Transbay Terminal. The City suggested that, given the high estimated costs to bring the building to seismic and code compliance, it was reasonable also to consider its replacement.

In November 1993, a "Transit Needs Study" was conducted by Caltrans and MTC to identify operational needs for an upgraded or new facility while Caltrans proceeded with critical seismic and safety improvements. Preliminary alternatives were proposed in a City Planning Department Report to the Mayor, based on its October 1993 *Transit Terminal Study.*

In June 1994, the City/County of San Francisco and Caltrans agreed to undertake a study for alternatives to replace the Transbay Terminal. In December 1994, the San Francisco Board of Supervisors created the Transbay Redevelopment Survey Area to prepare a land use and transportation plan. During 1995 and 1996, terminal upgrade and replacement alternatives were studied by the San Francisco Redevelopment Agency and Planning Department, Caltrans, a Policy

Advisory Committee representing the transit operators using the Transbay Terminal, a Citizens Advisory Committee, and a Technical Advisory Committee.

The *Transit Terminal Decision Report* (released in October, 1995), yielded three primary options: (1) a new transit terminal on the site of the present Transbay Terminal, (2) a new terminal between Main and Beale Streets, south of the 201 Mission Street building and north of Folsom Street, and (3) a surface terminal at the Main/Beale site. These options are the basis of the replacement mitigation options being considered for the proposed project, as described herein. On March 4, 1996, the San Francisco Board of Supervisors recommended the Main-Beale site (identified as Main/Beale North) as the City's preferred bus terminal alternative (see Section 10.1.4 for a summary of reasons for this preference), and recommended locating the proposed new CalTrain terminal underground at the site of the existing Transbay Terminal.

Replacement Mitigation Options in the Context of the CalTrain Extension Project

Constructing a new underground CalTrain terminal on the site of the present Transbay Terminal would require demolition of the present terminal building, the bus access ramps, the underground parking garage and other related facilities on the site. Displacement of the terminal would affect transit operations, taxi operations, and other terminal area activities as described in Chapter 5. This chapter describes and evaluates mitigation measures proposed to address these impacts. These measures are consistent with and evolve from the Transbay Area Plan studies, as described above.

The objective of formulating and assessing the impacts of alternative mitigation measures is threefold. First is to propose effective mitigation for the various bus terminal displacement impacts. Second is to demonstrate the feasibility of the proposed replacement mitigation measures. Third is to present sufficient information to provide decision makers and the public with a basis for identifying preferable replacement options.

This description and evaluation are provided within various practical constraints. On the one hand, the potential extent of the impacts to Transbay Terminal area transit operators and other transportation providers are such that relatively extensive treatment is required to determine the feasibility of the mitigation measures proposed. On the other hand, the detail provided here does not extend beyond the needs of mitigation. There is no intention to design the proposed replacement facilities except insofar as these must be configured to demonstrate that the transportation services displaced by construction of the new CalTrain Terminal can be adequately accommodated and to describe the potential environmental effects associated with the new facilities.

Further, no attempt is made in this document to define or provide environmental impact assessment for any of the various site development or related land use proposals which could be advanced in concert with the new transit terminal facilities, or to qualify alternative joint development or other funding/financing strategies. These specific site development proposals are left to the sponsors of any such future projects. It is assumed that design, construction, and funding of the selected terminal replacement option would be by others.

6.2 DESCRIPTION OF REPLACEMENT OPTIONS

Four design options are under consideration for the replacement bus facilities proposed to mitigate the impacts of demolishing the existing Transbay Terminal. The four options are: (1) replace the existing bus terminal with a new bus terminal located between Main and Beale Streets south of the Pacific Gateway Building (201 Mission) nearly to Folsom Street; (2) construct a new bus terminal above the underground CalTrain station at the existing Transbay Terminal site; (3) replace the existing facility with a surface bus terminal between Main and Beale Streets south of the Pacific Gateway Building nearly to Folsom Street, and (4) replace the existing facility with a surface bus terminal on the site of the current Transbay Terminal. Each option incorporates alternative proposals to address the various transit service and related functions that need to be accommodated by the replacement facilities.

In all four cases, CalTrain would be located underground at the site of the existing Transbay Terminal. An underground walkway could be constructed to link the underground CalTrain terminal to the BART/Muni Metro Embarcadero Station; but this is considered an optional feature. A summary of features for each of the options is provided in Table 6.2-1. The four options are described in the following sections.

6.2.1 Option A - New Bus Terminal Building at Main-Beale Site

Option A proposes a new three-level bus terminal on a site bounded by Beale and Main Streets and the southern perimeter of the Pacific Gateway building (201 Mission), south nearly to Folsom Street (Figure 6.2-1). New exclusive aerial ramps adjacent to the Fremont Street auto ramp would provide grade-separated bus access between the Bay Bridge and the second and third levels of the terminal. These exclusive ramps would also contain midday storage area for approximately 80 AC Transit buses. The area underneath the ramps would be adequate for 80 vanpool parking spaces. Construction would be staged to ensure occupancy and operation of the replacement bus facilities prior to demolition of the existing Transbay Terminal.

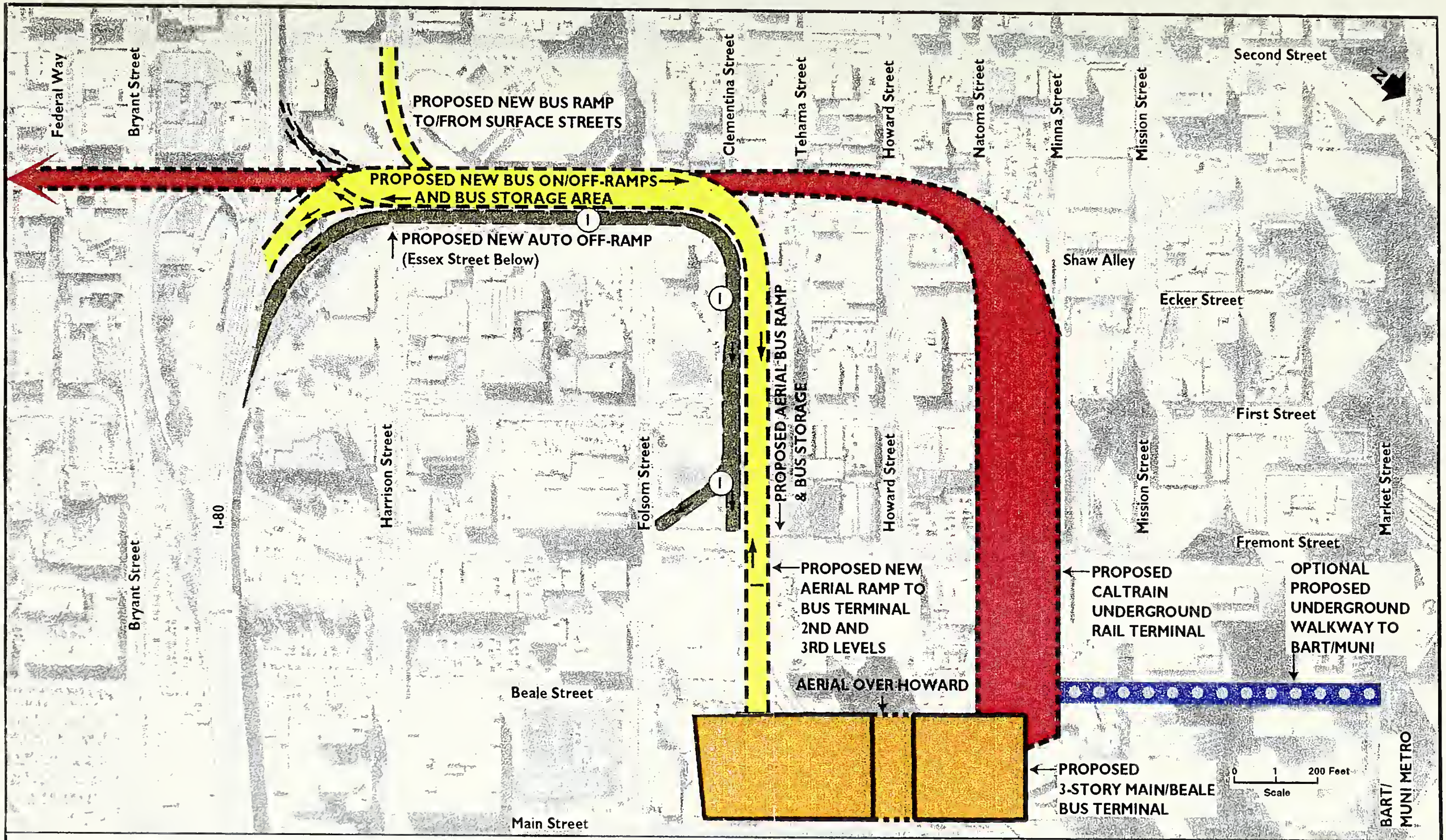
Passenger ticketing and retail space would be available at street level. AC Transit, Greyhound, Amtrak, and Airporter buses would use approximately 50 bus bays on the second and third levels which would cross over Howard Street. Greyhound freight service would also be accommodated

Table 6.2-1
Mitigation Options for Demolition of the Transbay Terminal Facility

	Option A	Option B		Option C	Option D
	Bus Terminal Building at Main-Beale Site	**Bus Terminal Building at Transbay Terminal Site**	**Temporary Surface Bus Facility at Main-Beale Site during Construction**	**Permanent Surface Bus Facility at Main-Beale Site**	**Permanent Surface Bus Facility at Transbay Terminal Site**
SURFACE BUS ACCESS (Muni, SamTrans, etc.)	Beale-Fremont pass through or Beale bus mall and turn-around loop	Beale-Fremont pass through	Same as existing, modified as required for demolishing the existing terminal	Beale-Fremont pass through	Beale-Fremont pass through
BAY BRIDGE BUS ACCESS (AC Transit)	New aerial bus ramp adjacent to Fremont auto ramp -- aerial over Harrison, Essex, Folsom, Clementina, First, Fremont, and Beale Streets	New aerial bus ramp along Essex Street Corridor -- aerial over Harrison, Essex, Folsom, Clementina, Tehama, Howard and Natoma streets	Existing aerial bus ramp adjacent to Fremont auto ramp -- aerial over Harrison, Essex, Folsom, Clementina, First, and Fremont streets -- brought to surface at Beale Street	**Option C1:** New aerial bus ramp over Harrison, Essex, Folsom, Clementina, First, and Fremont streets adjacent to Fremont auto ramp -- brought to surface at Beale Street **Option C2:** Use of new Fremont auto ramp and surface streets	Use of new Fremont auto ramp and exclusive bus lane on Fremont Street to Transbay Terminal Site. Use of surface right-of-way over CalTrain subway for exclusive HOV lane from Terminal site to Essex Street freeway on-ramp at Harrison Street.
MIDDAY BUS STORAGE LOCATION	On widened Essex and Fremont aerial bus ramps -- approximately 80 spaces	Widened Essex Street aerial bus ramps -- approximately 65 spaces	Surface lot on vacant Caltrans R/W at Folsom and Fremont Street	Remote surface lot -- Options include 7th and Townsend or 16th and Owens (depending on midday train storage location selected)	**Short-Term:** 106 spaces in CalTrain Terminal Station shell beneath surface bus facility **Long-Term:** Remote surface lot -- Options include 7th and Townsend or 16th and Owens (depending on midday train storage location selected)

Table 6.2-1
Mitigation Options for Demolition of the Transbay Terminal Facility

	Option A	Option B		Option C	Option D
	Bus Terminal Building at Main-Beale Site	**Bus Terminal Building at Transbay Terminal Site**	**Temporary Surface Bus Facility at Main-Beale Site during Construction**	**Permanent Surface Bus Facility at Main-Beale Site**	**Permanent Surface Bus Facility at Transbay Terminal Site**
NUMBER OF BUS BAYS IN TERMINAL	AC Transit = 30 Greyhound = 9 Other = 11 Total = 50	AC Transit = 30 Greyhound = 9 Other = 6 Total = 45	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35	AC Transit = 21 Greyhound = 8 Other = 6 Total = 35
GOLDEN GATE TRANSIT (GGT)	Layover in terminal, in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street	Layover in remote storage yard or on street
GREYHOUND FREIGHT	In terminal	In terminal	Displaced	In terminal	Adjacent to terminal
TERMINAL CONFIGURATION		Transbay Terminal Short and Medium Options		Simple roof-and-wall structure (to protect from weather and visually screen)	Surface bus mall
PARKING	About 600 spaces underground (optional)	None	None	None	None
TERMINAL RETAIL	35,000 - 50,000 square feet in ground floor of new terminal	35,000 - 50,000 square feet in ground floor of new terminal	None	None	None


Federal Way
Bryant Street
PROPOSED NEW BUS RAMP
TO/FROM SURFACE STREETS
Clementina Street
Tehama Street
Howard Street
Natoma Street
Minna Street
Mission Street
Second Street
N
PROPOSED NEW BUS ON/OFF-RAMPS
AND BUS STORAGE AREA
PROPOSED NEW AUTO OFF-RAMP
(Essex Street Below)
①
Shaw Alley
Ecker Street
PROPOSED AERIAL BUS RAMP
& BUS STORAGE
First Street
Harrison Street
Folsom Street
Howard Street
Mission Street
Market Street
I-80
Bryant Street
Fremont Street
PROPOSED NEW
AERIAL RAMP TO
BUS TERMINAL
2ND AND
3RD LEVELS
PROPOSED
CALTRAIN
UNDERGROUND
RAIL TERMINAL
OPTIONAL
PROPOSED
UNDERGROUND
WALKWAY TO
BART/MUNI
Beale Street
AERIAL OVER HOWARD
PROPOSED
3-STORY MAIN/BEALE
BUS TERMINAL
0
1
200 Feet
Scale
BART/
MUNI METRO
Main Street

① The exact location of the Fremont Street off-ramp and the exclusive bus ramp is now under study by Caltrans and is subject to change.

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BUS TERMINAL MAIN/BEALE SITE
OPTION A

Figure 6.2-1

inside the terminal. Some Golden Gate Transit buses could layover in the terminal or at a remote storage site. Muni and SamTrans operations would be on surface streets in the vicinity and via either a proposed new Beale-Fremont Pass-Through Facility or via a possible Beale Street transit mall (both options are described in this section). A basement level parking garage could also be constructed for up to 600 vehicles.

The proposed bus facility could be linked to the underground CalTrain station beneath Beale Street. A optional 950-foot-long pedestrian concourse containing moving sidewalks under Beale Street could be constructed to connect the bus and train terminals with the Embarcadero BART/Muni Metro Station.

Cost estimates for this mitigation option are about $160.3 million. This option is the City of San Francisco's preferred approach. (See Section 10.1.4 for a summary of reasons for this preference.)

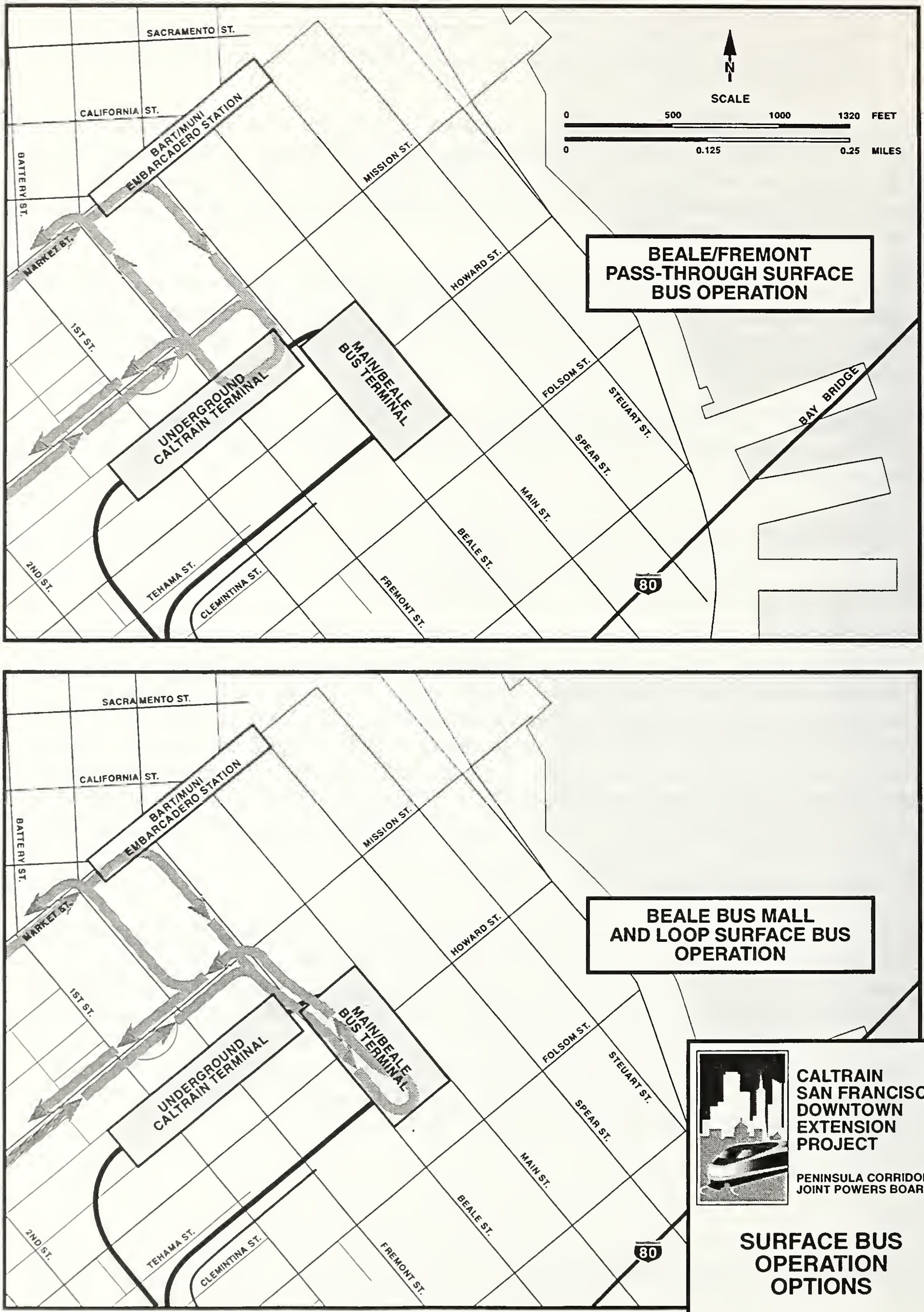
Two options for surface street bus access to the new terminal are proposed, as follows.

Surface Bus Access Options - Beale-Fremont Pass Through

Under this option, Muni and SamTrans buses would travel south on Beale Street (from Mission and Market Streets) and turn right into a designated bus-only zone to be located at street level between Mission and Howard Streets, directly above the underground CalTrain terminal. Passengers would be dropped off before buses entered the zone along the west side of Beale Street. The zone would contain areas for passenger loading as well as bus layovers. Exiting buses would turn right from the loading area onto Fremont Street and proceed north towards Mission and Market Streets. (See Figure 6.2-2.) Golden Gate Transit buses would operate on Beale Street and Fremont Street. They would drop off and pick up passengers at designated stops.

Surface Bus Access Options - Beale Bus Mall and Loop

Under this option, all buses would travel south on Beale Street and, once past Mission Street, turn left into a two-way, bus-only mall that would run along the east side of Beale Street, as described below under street network modifications. Bus drop-off islands would be provided along the west side of the southbound bus lane. After unloading, buses would continue southward and turn left into a turn-around loop located on the ground level of the new bus terminal at Main and Beale Streets. (Layover areas would be provided next to the loop). Exiting the loop, buses would return northward in a bus-only contra-flow lane towards Mission Street, with pick-up areas located on the east sidewalk of Beale Street, as shown in Figure 6.2-2.


SACRAMENTO ST.
CALIFORNIA ST.
BATTERY ST.
MARKET ST.
BART/MUNI EMBARCADERO STATION
MISSION ST.
HOWARD ST.
FOLSOM ST.
STEUART ST.
SPEAR ST.
MAIN ST.
BEALE ST.
FREMONT ST.
1ST ST.
2ND ST.
TEHAMA ST.
CLEMINTINA ST.
UNDERGROUND CALTRAIN TERMINAL
MAIN/BEALE BUS TERMINAL
BAY BRIDGE
80
N
SCALE
0
500
1000
1320
FEET
0
0.125
0.25
MILES
BEALE/FREMONT PASS-THROUGH SURFACE BUS OPERATION
BEALE BUS MALL AND LOOP SURFACE BUS OPERATION

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SURFACE BUS OPERATION OPTIONS

Figure 6.2-2

Street Network Modifications

Modifications to the street network associated with Option A would be:

- Beale Street would be reduced from the existing four lanes to two lanes for southbound automobile traffic between Market Street and Folsom Street, with exclusive left-side southbound and northbound lanes for buses (Beale Bus Mall and Loop Surface Bus Access Option only).
- Howard Street would be converted from the existing four lanes two-way operation to four lanes one-way westbound between Main Street and Fremont Street.
- Essex Street would be extended south from Howard Street to Folsom Street, as a two-lane one-way southbound street, serving westbound traffic on Howard Street heading for the I-80 eastbound on-ramp at Harrison Street/Essex Street.
- Intersection geometry along First Street from Market Street to Howard Street would be modified slightly to include three mixed-flow southbound traffic lanes with no exclusive transit lanes and parking on both sides.
- For Option C1, a new exclusive bus ramp to/from I-80 (Bay Bridge) would touch down at Beale Street between Howard and Folsom Streets serving trans-bay buses to the surface terminal. This would require adding a new signalized intersection on Beale Street between Howard and Folsom Street.

6.2.2 Option B - New Bus Terminal Building at Transbay Terminal Site

Under Option B, a new bus facility would be constructed directly above the underground CalTrain station at the Transbay Terminal site. Three levels plus a partial mezzanine level would provide for ticketing, passenger loading and unloading, and passenger and bus circulation. New, exclusive aerial ramps adjacent to the Essex Street auto ramp would provide grade-separated bus access between the Bay Bridge and the second and third levels of the new terminal. These ramps would also provide midday storage for up to 65 AC Transit buses.

A total of 45 bus bays would be provided in the terminal for use by AC Transit, Greyhound, Airporter, and Amtrak buses; Golden Gate Transit buses would layover on surface streets in the vicinity. Greyhound freight services would be accommodated in the terminal. No underground parking is possible in this option because the CalTrain terminal would occupy the entire basement level. Retail space would be provided. Elevators and escalators would provide circulation between the bus, mezzanine, street, and underground (CalTrain) levels. Bus access would be via the Beale-Fremont Pass Through as described above.

"Short" and "Medium" Terminal Configurations

Two alternate configuration options are proposed for the bus terminal above the CalTrain terminal at the Transbay Terminal site. A "short" configuration bus terminal would occupy a smaller footprint than that of the present Transbay Terminal (See Figure 6.2-3). It would cross over First Street on the west end of the building but would stop at Fremont Street on the east end.

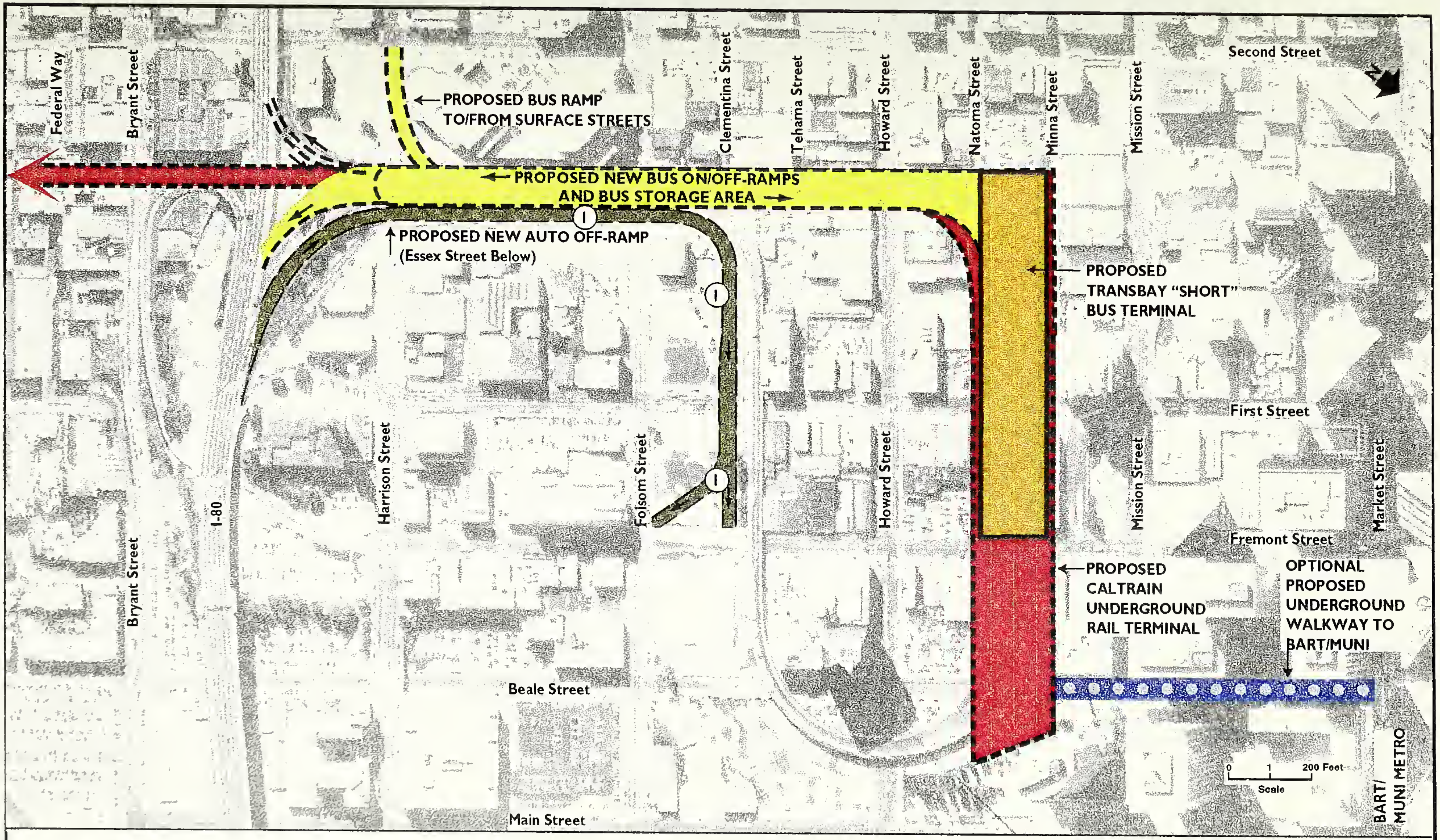
The "medium" configuration would be similar in size to the present Transbay Terminal and would cross over both First and Fremont Streets (See Figure 6.2-4). The medium configuration would accommodate a circular path for buses surrounding a large, enclosed pedestrian waiting concourse inside the terminal.

Cost estimates for this mitigation option for the "short" terminal configuration (including the temporary surface facility described below) are approximately $164.3 million. For the "medium" terminal configuration (including the temporary surface facility), cost estimates are $158.6 million.

To implement a New Bus Terminal Building at the Transbay Terminal Site, a temporary bus terminal facility would be needed to continue bus operations during demolition of the existing Transbay Terminal and construction of the new CalTrain and bus terminal on the Transbay Terminal site. The temporary facility would be similar to the new surface bus terminal described as Option C in Section 6.2.3, and would be located at the Main-Beale Site, between Main and Beale Streets, on both sides of Howard Street. No large structure is envisioned. AC Transit buses would enter a surface bus lot via the existing aerial bus ramp adjacent to the Fremont Street auto ramp; this ramp would be brought to surface just west of Beale Street.

Due to seismic considerations, Caltrans is considering demolishing the existing eastern loop of the existing bus ramp. If this ramp were to be demolished prior to construction and operation of a new bus terminal building at the Transbay Terminal Site (Mitigation Option B), then alternative surface access would need to be provided to the temporary bus facility.

A total of approximately 35 bus bays would be provided for use by AC Transit, Greyhound, Airporter, and Amtrak buses. Bus access for Muni and SamTrans would be the same as current operations except for minor modifications needed during demolition of the existing Transbay Terminal or construction of the new underground CalTrain terminal and above-ground bus terminal. Golden Gate Transit would operate on the adjacent surface streets. There would not be sufficient room for Greyhound freight operations to continue at the temporary surface facility and these would be displaced to alternate temporary location(s). There would be no vehicle parking and minimal or no space available for retail development.


Federal Way
Bryant Street
PROPOSED BUS RAMP
TO/FROM SURFACE STREETS
Clementina Street
Tehama Street
Howard Street
Natoma Street
Minna Street
Mission Street
Second Street
PROPOSED NEW BUS ON/OFF-RAMPS
AND BUS STORAGE AREA
1
PROPOSED NEW AUTO OFF-RAMP
(Essex Street Below)
PROPOSED
TRANSBAY "SHORT"
BUS TERMINAL
1
First Street
Harrison Street
Folsom Street
1
Howard Street
Mission Street
Market Street
I-80
Bryant Street
Fremont Street
PROPOSED
CALTRAIN
UNDERGROUND
RAIL TERMINAL
OPTIONAL
PROPOSED
UNDERGROUND
WALKWAY TO
BART/MUNI
Beale Street
Main Street
0
1
200 Feet
Scale
BART/
MUNI METRO

① The exact location of the Fremont Street off-ramp and the exclusive bus ramp is now under study by Caltrans and is subject to change.

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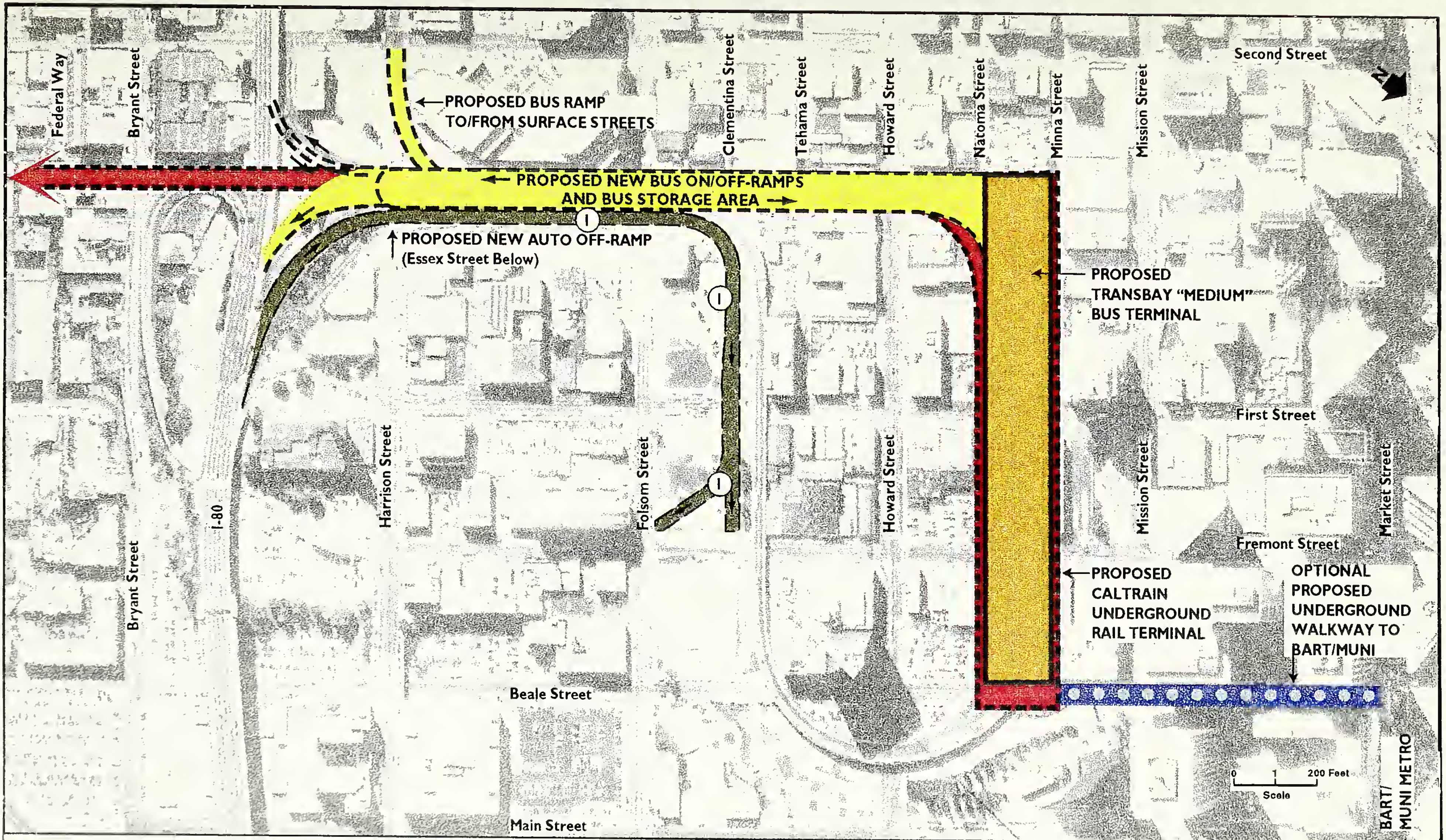
BUS TERMINAL AT TRANSBAY TERMINAL SITE
"SHORT" DESIGN CONFIGURATION
OPTION B-1

Figure 6.2-3



Federal Way
Bryant Street
PROPOSED BUS RAMP TO/FROM SURFACE STREETS
Clementina Street
Tehama Street
Howard Street
Natoma Street
Minna Street
Mission Street
Second Street
N
PROPOSED NEW BUS ON/OFF-RAMPS AND BUS STORAGE AREA
PROPOSED NEW AUTO OFF-RAMP (Essex Street Below)
PROPOSED TRANSBAY "MEDIUM" BUS TERMINAL
First Street
Harrison Street
Folsom Street
Howard Street
Mission Street
Market Street
I-80
Bryant Street
Fremont Street
PROPOSED CALTRAIN UNDERGROUND RAIL TERMINAL
OPTIONAL PROPOSED UNDERGROUND WALKWAY TO BART/MUNI
Beale Street
Main Street
0
1
200 Feet
Scale
BART/ MUNI METRO

① The exact location of the Fremont Street off-ramp and the exclusive bus ramp is now under study by Caltrans and is subject to change.

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BUS TERMINAL AT TRANSBAY TERMINAL SITE
"MEDIUM" DESIGN CONFIGURATION
OPTION B-2

Figure 6.2-4

The temporary surface facility would be built prior to interruption of operations at the existing Transbay Terminal. Following construction of the CalTrain terminal and new bus terminal above it, the temporary facility would be removed and the area it occupied could be made available for other development.

Midday storage for AC Transit buses could be on a surface lot on vacant Caltrans right-of-way at Folsom and Fremont Streets, at Seventh and Townsend (if the new CalTrain storage yard is located at this site) or at Seventh and Sixteenth Streets, east or west of I-280 (if this site is selected for the new CalTrain storage yard). Any space remaining after AC Transit's midday storage needs were met could be used for midday storage of Golden Gate Transit buses.

Street Network Modifications

Modifications to the street network associated with Option B would be:

- Howard Street would be converted from the existing four-lane two-way operation to four lanes one-way westbound between Main Street and Fremont Street.

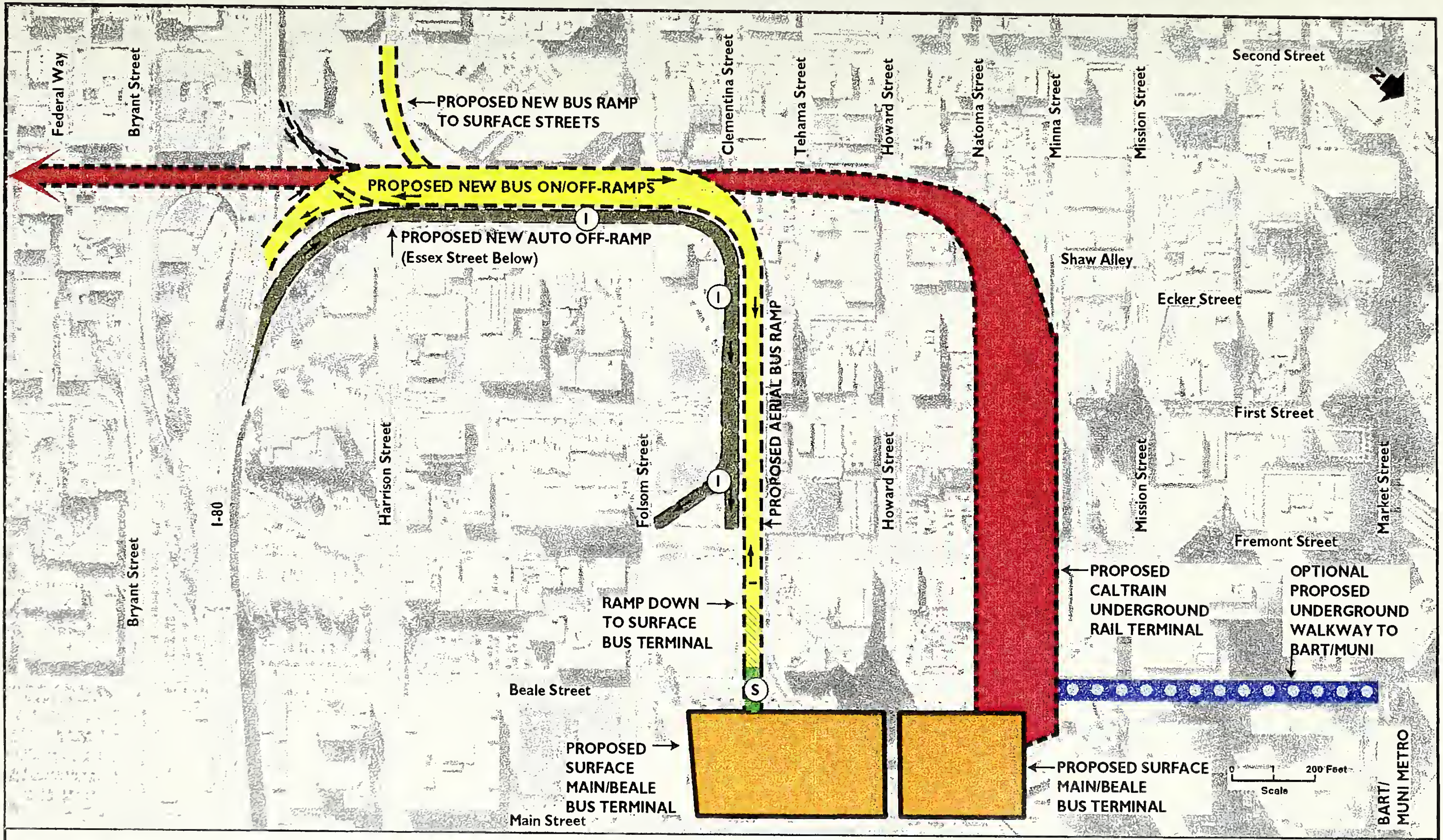
- Essex Street would be extended south from Howard Street to Folsom Street serving westbound traffic on Howard Street heading for the eastbound I-80 on-ramp at Harrison Street/Essex Street.

- Intersection geometry along First Street from Market Street to Howard Street would be modified slightly to include three mixed-flow southbound traffic lanes with no exclusive transit lanes and parking on both sides.

6.2.3 Option C -New Surface Bus Facility at Main-Beale Site

A third bus terminal mitigation option would be to develop a permanent surface bus facility on the Main-Beale site (See Figure 6.2-5). A simple roof-and-wall structure for weather protection and visual screening is proposed. This proposal would greatly reduce construction costs in comparison with the multi-level above-ground bus facility envisioned in Options A or B. In Option C, the street-level terminal would occupy both sides of Howard Street between Beale and Main Streets.

AC Transit access to and from the Bay Bridge would be via one of two options: (1) a new aerial bus ramp adjacent to the Fremont auto ramp brought to surface at Beale Street (Option C1); or (2) the new Folsom Street off-ramp (Option C2). Under Option C2, buses would continue east along Folsom Street in mixed traffic and turn north on Main Street into the surface terminal. Return routing would be west on Howard, left on Beale heading south to Bryant Street, right on Bryant heading west to the Sterling Street on-ramp for the Bay Bridge.


Federal Way
Bryant Street
PROPOSED NEW BUS RAMP TO SURFACE STREETS
PROPOSED NEW BUS ON/OFF-RAMPS
PROPOSED NEW AUTO OFF-RAMP (Essex Street Below)
Clementina Street
Tehama Street
Howard Street
Natoma Street
Minna Street
Mission Street
Second Street
N
Shaw Alley
Ecker Street
First Street
I-80
Harrison Street
Folsom Street
PROPOSED AERIAL BUS RAMP
Howard Street
Mission Street
Market Street
Fremont Street
Bryant Street
RAMP DOWN TO SURFACE BUS TERMINAL
PROPOSED CALTRAIN UNDERGROUND RAIL TERMINAL
OPTIONAL PROPOSED UNDERGROUND WALKWAY TO BART/MUNI
Beale Street
S
PROPOSED SURFACE MAIN/BEALE BUS TERMINAL
PROPOSED SURFACE MAIN/BEALE BUS TERMINAL
Main Street
0
200 Feet
Scale
BART/ MUNI METRO

① The exact location of the Fremont Street off-ramp and the exclusive bus ramp is now under study by Caltrans and is subject to change.

Ⓢ New traffic signal.

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SURFACE BUS FACILITY AT MAIN/BEALE SITE
OPTION C1

Figure 6.2-5

Under Option C, a total of approximately 35 bus bays would be provided for use by AC Transit, Greyhound, Airporter, and Amtrak buses. Muni and SamTrans buses would operate via the Beale-Fremont Pass Through facility as detailed in the other options. Golden Gate Transit would operate on the adjacent surface streets.

The surface facility would have room for Greyhound freight services, but would not include underground automobile parking and would offer minimal or no room for retail service development. The cost estimate for the permanent surface lot terminal with direct ramp access mitigation option is approximately $67.7 million (Option C1). The cost of Option C2 is approximately $10 million less because no direct freeway access ramp is included.

The proposed bus facility could be linked to the underground CalTrain station beneath Beale Street. An optional 950-foot long pedestrian concourse containing moving sidewalks under Beale Street could be constructed to connect the bus and train terminals with the Embarcadero BART/Muni Metro Station.

Midday storage for AC Transit buses would not be provided on new aerial bus ramps but would instead be provided at a remote surface lot. Possible locations include Seventh and Townsend (if the new CalTrain storage yard is located at this site) or Seventh and Sixteenth streets, east or west of I-280 (if this site is selected for the new CalTrain storage yard). Any space remaining after AC Transit's midday storage needs were met could be used for midday storage of Golden Gate Transit buses.

Street Network Modifications

Modifications to the street network associated with Option C would be:

- Howard street would be converted from the existing four-lane two-way operation to three lanes one-way westbound between Main Street and Fremont Street in order to accommodate the bus terminal design.
- Essex Street would be extended south from Howard Street to Folsom Street as a two-lane one-way southbound street serving westbound traffic on Howard Street heading for the I-80 eastbound on-ramp at Harrison Street/Essex Street.
- Intersection geometry along First Street from Market Street to Howard Street would be modified slightly to include three mixed flow southbound traffic lanes with no exclusive transit lanes and parking on both sides.

6.2.4 Option D -New Surface Bus Facility at Transbay Terminal Site

Option D would be a designed and landscaped surface bus plaza on the site of the current Transbay Terminal above the CalTrain Terminal Station. AC Transit operations would occur in the surface terminal bus plaza. Buses coming from the Bay Bridge would gain access to the surface terminal using the new Fremont auto/bus ramp and an exclusive bus/car pool lane north on Fremont Street. Exiting the surface terminal, buses would utilize a new, exclusive surface bus roadway located on the surface above the CalTrain subway box heading south to the Essex Street I-80 freeway on-ramp. There would be signalized intersections at all locations where the bus roadways cross existing streets (See Figure 6.2-6).

For Option D, a total of approximately 35 bus bays would be provided for use by AC Transit, Airporter, and Amtrak buses. A simple roof-and-wall structure for weather protection and visual screening is proposed. This proposal would greatly reduce construction costs in comparison with the multi-level above-ground bus facility envisioned in Options A or B.

Muni and SamTrans buses would operate via the Beale-Fremont Pass Through facility as detailed in the other options. Golden Gate Transit would operate on the adjacent surface streets. Accommodations for Greyhound would be provided adjacent to the surface facility. Capital costs for Option D are estimated at $64.7 million for the surface bus plaza.

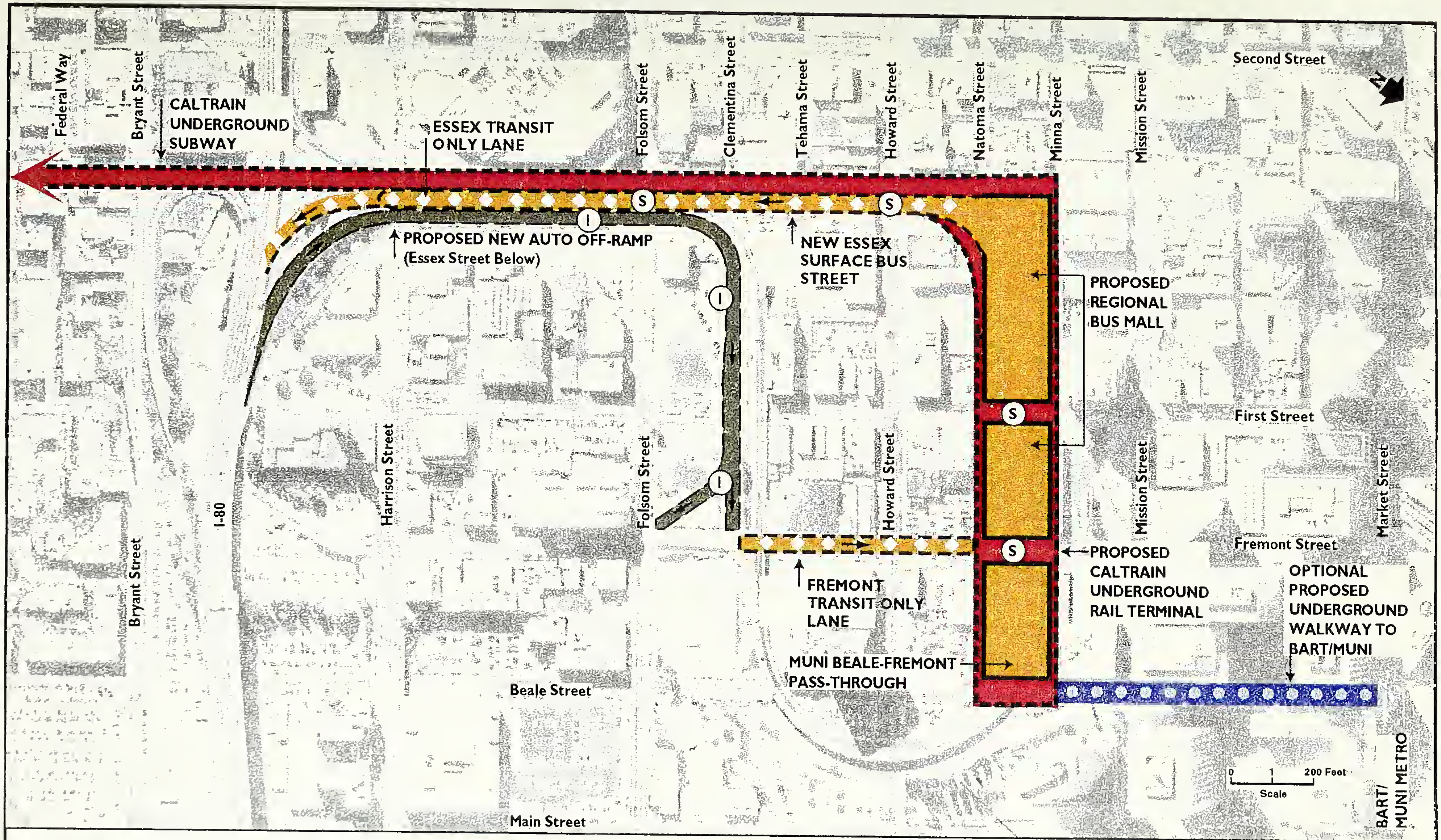
This surface option would be built after the existing terminal and ramps were torn down and the underground CalTrain terminal shell was built on the Transbay Terminal site. Construction of the CalTrain terminal shell would be part of a phasing for the CalTrain project, as discussed in Chapter 12. Capital costs for construction of the CalTrain Terminal station shell and the cut-and-cover CalTrain subway section from Folsom Street to the terminal are estimated at some $167 million.

The shell for the CalTrain terminal station would be used for midday bus storage until such time as the CalTrain extension project was fully operational.

Street Network Modifications

Modifications to the street network associated with Option D would be:

- Fremont Street would be restriped between the Folsom Street and Mission Street to provide a continuous exclusive transit/carpool lane from the I-80 off-ramp to Market Street.
- An access route would be built from the surface terminal to the intersection of Howard Street and Essex Street for bus access to the Bay Bridge.


Federal Way
Bryant Street
CALTRAIN UNDERGROUND SUBWAY
ESSEX TRANSIT ONLY LANE
Folsom Street
Clementina Street
Tehama Street
Howard Street
Natoma Street
Minna Street
Mission Street
Second Street
N
S
I
PROPOSED NEW AUTO OFF-RAMP (Essex Street Below)
NEW ESSEX SURFACE BUS STREET
PROPOSED REGIONAL BUS MALL
First Street
I-80
Harrison Street
Folsom Street
Howard Street
Mission Street
Market Street
Bryant Street
FREMONT TRANSIT ONLY LANE
PROPOSED CALTRAIN UNDERGROUND RAIL TERMINAL
Fremont Street
OPTIONAL PROPOSED UNDERGROUND WALKWAY TO BART/MUNI
MUNI BEALE-FREMONT PASS-THROUGH
Beale Street
Main Street
0
1
200 Feet
Scale
BART/ MUNI METRO

Ⓘ The exact location of the Fremont Street off-ramp and the exclusive bus ramp is now under study by Caltrans and is subject to change.

Ⓢ New traffic signal.

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

BUS PLAZA AT TRANSBAY TERMINAL
OPTION D

Figure 6.2-6

- New signalized intersections would be installed at the intersection of First Street and the bus terminal, at Fremont Street and the bus terminal, and at the intersection of Howard Street and Essex Street extension.

- A new MUNI/SamTrans pass-through facility would be built between Beale Street and Fremont Street.

- Howard Street would be converted from the existing four-lane two-way operation to four lanes one-way westbound between Main Street and Fremont Street.

- Essex Street would be extended south from the proposed surface terminal, across Howard Street, and to Folsom Street. The new section of Essex Street between Howard and Folsom Street would be used by carpool vehicles and buses only during the PM peak commute period. Similarly, the existing section of Essex Street, from Folsom Street to Harrison Street, which connects to the I-80 westbound on-ramp, currently mixed-flow traffic operation, would be restricted to carpool vehicles and buses only during the PM peak commute period.

- Lane geometry along First Street from Market Street to Howard Street would be modified slightly from that proposed in the DPT Variant Alternative, to include three mixed-flow southbound traffic lanes with no exclusive transit lanes and with parking on both sides.

6.3 IMPACTS ON TRANSIT

Public and private transit services currently serving the Transbay Terminal would experience both temporary and permanent operating impacts from relocation or reconstruction of bus facilities. Based on the analysis presented below, it appears that Options A or B would have fewer impacts on transit operations than would Options C or D. Although Options C and D would cost the least to construct, they would have the most adverse and costly impacts on ongoing transit operations given that they would not provide for a grade-separated, exclusive bus-only access from the Bay Bridge to/from the bus facility, nor would they provide for on-site, midday bus storage in the long term, as would Options A and B. The following sections describe the long-term impacts associated with each option.

6.3.1 Option A: New Bus Terminal Building at Main-Beale Site

Bus access to the Main-Beale terminal would be via new exclusive east-west bus ramps between Howard and Folsom streets, extended east over Beale to the building structure. The ramps would be bi-directional. They would become two-level at the approach to the structure to allow for direct access to bus bays on both level two and level three. The specific design of these level change structures would be determined during the final design phase of the project. For buses and other vehicles that require access to and from surface streets, on-off ramps to Second Street would be rebuilt in approximately their existing location between Harrison Street and the Bay Bridge.

Dedicated areas on the bus access ramps or within the bus facility or a combination of both locations would allow midday parking of AC Transit buses that do not need to return to service or bus maintenance divisions in the East Bay between the a.m. and p.m. commuter periods.

Compared with operations at the existing Transbay Terminal, AC Transit buses are expected to incur a slight increase in the revenue miles traveled annually when using the Main-Beale terminal. As shown in Table 6.3-1, at current levels of transbay service, annual revenue vehicle miles are projected to increase by 11,000 (one percent), which is primarily due to added distance for buses circulating through and reversing direction in the new bus facility. This increase is less than one percent of the total annual miles traveled on AC Transit's transbay routes and is expected to result in an annual operating cost increase on the order of $42,000. Non-revenue bus miles would not be substantially affected by moving operations to a multi-story terminal at Main-Beale, assuming bus storage is provided on the new aerial ramp structures as proposed.

In the event not all of AC Transit's midday storage needs can be accommodated in the final design of the bus ramps and/or bus facility, AC Transit would be required to deadhead buses to either another site or to bus divisions in the East Bay. Non-revenue miles and deadhead costs would increase accordingly. The impacts on AC Transit of bus deadheading are evaluated in more detail under Mitigation Option C.

Other bus operators (Greyhound, Gray Line, other private tours and charters, and possibly Golden Gate Transit) that would share use of the bus facility would also incur slight increases in bus miles compared to their existing operations in the Transbay Terminal. The overall change in bus vehicle miles would not be considered major. In all cases, the estimated effects on vehicle miles of operation for the alternative bus facility sites are preliminary. Final facility design may result in reducing circulation requirements and eliminating most of the added travel distance within levels two and three of the facility.

Surface bus facility improvements would mainly affect Muni and SamTrans since they use the existing Transbay Terminal as a major transfer center and/or bus layover/turnaround. Muni trolley buses and the F Line streetcar currently stop along the crescent in front of the terminal; several routes also serve the Terminal at bus stops along Mission, First, and Fremont streets. SamTrans has stops on Mission Street and in the crescent in front of the Transbay Terminal, turning back most buses by using city streets (Beale, Howard, and Fremont). Moving surface bus activity east towards Beale Street north of the Main-Beale bus facility would affect both Muni and SamTrans operations.

Table 6.3-1
Change in Annual Revenue Miles and Annual Revenue Hours for each Bus Terminal Mitigation Option

Operator	Option A		Option B	Option C	Option D
	Bus Terminal Building at Main-Beale Site		Bus Terminal Building at Transbay Terminal Site	Surface Bus Facility at Main-Beale Site	Surface Bus Facility at Transbay Terminal Site
	Beale-Fremont Pass-through	Beale St. Mall			
Muni					
Change in Rev. Mi./Yr.	+ 33,600	+ 102,000	+33,600	+45,100	+33,600
Change in Rev. Hr./Yr.	- 1,200	+ 6,400	- 1,200	-400	-1,200
SamTrans					
Change in Rev. Mi./Yr.	- 1,900	+ 4,500	- 1,900	- 1,900	-1,900
Change in Rev. Hr./Yr.	- 2,100	+ 2,200	- 2,100	- 2,100	-2,100
AC Transit					
Change in Rev. Mi./Yr.	+11,000	+11,000	"Short" Terminal - 13,700 "Medium" Terminal +1,000	C1 = - 2,900 C2 = +4,500	-10,800
Change in Rev. Hr./Yr.	400	400	"Short" Terminal +400 "Medium" Terminal +2,400	C1 = +7,200 C2 = +12,600	+7,700
Change in Deadhead Mi./Yr. [1]	0	0	0	+99,960	Short-term = 0 Long-term = +99,960
Change in Deadhead Hr./Yr.[1]	0	0	0	+8,330	Short-term = 0 Long-term = +8,330

[1] Midday storage for AC Transit buses under Option C would be located either at 16th and Owens Streets or 7th and Irwin Streets. Travel to this remote storage lot would create the additional deadhead miles and hours. Midday storage for AC Transit buses under Option D would be located in the CalTrain Terminal Station shell in the short term and at 16th and Owens or 7th and Irwin in the long-term

Source: Nelson/Nygaard

Using either of the surface bus access options described in Section 6.2.1 and with the changes in the street network, Muni lines 5, 12, 38, 38L, 42 and 76 would be slightly rerouted from their current routing. The SamTrans routes that would still continue to serve downtown San Francisco after the proposed CalTrain extension opened would also be slightly rerouted. Golden Gate Transit would operate on Beale Street and in the new terminal.

Under the Beale-Fremont Pass Through option, Muni revenue miles are projected to increase by 33,600 annually compared to the 2010 No-Build Alternative, at an approximate cost of $56,000. SamTrans revenue miles are projected to decline by 1,900, with an estimated annual cost reduction of $85,000.

Under the Beale Street Bus Mall and Loop option, both Muni and SamTrans revenue bus miles are projected to increase, on the order of 102,000 and 4,500 miles, respectively. For this option, annual operating costs for Muni are estimated to increase by about $596,000, and for SamTrans, by about $92,000.

On the basis of cost and general bus operating considerations, the Beale-Fremont Pass Through option would be the preferred surface bus facility. Although Muni would experience a slight increase in vehicle miles, a new pass-through would be an improvement compared with existing congested operations at the crescent in front of the Transbay Terminal. Added space for pick-up, drop-off and layover would be available. Full priority treatments for bus access to and from the facility would be provided and would allow for safer operations. Improved passenger facilities would make transit connections and transfers more convenient.

For SamTrans, not only would operating costs potentially decline but service reliability would likely improve. Turnback of buses would be possible at an off-street facility, and traffic congestion could be avoided. The Beale Street Bus Mall and Loop would also provide dedicated bus facilities, including an off-street turnback, but would require additional travel for both Muni and SamTrans and contraflow operations for two blocks.

6.3.2 Option B: New Bus Terminal Building at Transbay Terminal Site

A new three-story bus facility above the CalTrain terminal at the existing Transbay Terminal site would dedicate levels two and three to bus operations for current Transbay Terminal users. Facility access would be provided by new, bi-level, north-south exclusive bus ramps connecting to the rebuilt West Loop Bay Bridge/I-80 aerial ramps. Midday bus parking would be provided on the West Loop ramps. Bus access to street level would be via the rebuilt access ramps currently connecting the ramp structure with Second Street. This option would use the proposed Beale-Fremont Pass Through as described in Section 6.2.1, for surface bus access.

Operating impacts on AC Transit would vary depending on whether a short or medium terminal configuration is adopted. The short configuration, with a smaller footprint, is projected to generate a decrease in revenue vehicle miles of approximately 13,700 annually; however, no cost savings are projected due to a slight increase in hours of operation for increased layover and bus stop dwells. The medium configuration would result in an additional 1,000 revenue-vehicle miles of operation annually, at a cost of approximately $158,000. Even though this change in revenue vehicle miles represents less than one percent of AC Transit's annual transbay revenue-miles operated, costs are expected to increase due to the projected increase of 2,400 annual service hours resulting from increased layover and bus stop dwells.

Other terminal users would experience similar order-of-magnitude changes in vehicle miles. Overall, bus operating and maintenance cost impacts, if any, of the short or medium terminal configuration are considered minor.

Operating impacts to Muni and SamTrans with a surface pass-through between Beale and Fremont would be the same as under Option A. The design of the facility would be similar, and Muni would be expected to incur additional annual operating costs estimated at $56,000, while SamTrans is projected to save $85,000 annually. The change in revenue-vehicle miles for each operator is less than one percent of total annual vehicle mileage.

6.3.3 Option C: New Permanent Surface Bus Facility at Main-Beale Site

Buses would gain access from the Bay Bridge to/from a New Surface Bus Facility at the Main-Beale Site in one of two ways: (1) a new, single-level, east-west exclusive bus ramp that would touch ground between Fremont and Beale Streets and make an at-grade crossing of Beale Street to enter the lot (Option C1) or, (2) the new Folsom Street off ramp and surface streets (Option C2).

Under Option C1, buses would cross Beale Street at-grade, and signalization of this bus crossing between Folsom and Howard streets would be required. Other modifications to the street network in the vicinity of the proposed surface facility would include converting Howard Street from four lanes in two-way operation to four lanes westbound only between Main Street and Fremont Street.

This terminal replacement option would use the Beale-Fremont Pass Through for surface bus access. As a result of the new pass-through and changes in the street network, Muni lines 1, 5, 12, 38, 38L, 41, and 42 would be slightly rerouted. The estimated increase in annual revenue-vehicle miles of travel is 45,000, or slightly higher than under Options A and B. The estimated annual operating cost increase for Muni is $56,000.

It is estimated that AC Transit would reduce its revenue-vehicle miles of operation with a surface facility due to a more efficient, one-level facility design; however, under Option C1, increased travel time from slower ramp speeds and at-grade crossing delays would increase revenue-hours of operation and generate a net increase in annual operating costs of approximately $445,000.

For Option C2, annual revenue miles are projected to increase by 4,500 while annual revenue hours are projected to increase substantially by some 12,600 due to the mixed-flow bus operations on city streets to and from the Bay Bridge. Annual operating costs for AC Transit are projected to increase by some $1.2 million.

Other bus operators that require access to the Bay Bridge/I-80 from the surface lot would experience similar travel time delays and possible increases in operating costs under Options C1 and C2.

No midday storage would be provided on the aerial bus ramp under this option; therefore, AC Transit would be required to deadhead buses back to the East Bay or to a remote lot in San Francisco. Remote storage could be provided at 16th and Owens streets or 7th and Townsend streets in San Francisco. Approximately 80 spaces would be provided for AC Transit. The deadhead travel to these remote lot locations would generate about 100,000 additional deadhead miles and 8,300 additional deadhead hours per year in AC Transit operations, with a corresponding increase in annual operating costs estimated at $692,000. Together with the cost increases from surface delays, AC Transit's annual operating costs for transbay bus service are projected to increase by $692,000 plus either $445,000 or $1.2 million, or some $1.14 to $1.89 million under this option.

SamTrans operations would be affected by the pass through only, and vehicle-miles and operating cost impacts would be the same as for Options A and B. Revenue-vehicle miles would be expected to decrease slightly, on the order of 1,900 miles.

6.3.4 Option D: New Permanent Surface Bus Facility at Transbay Terminal Site

Bus access from the Bay Bridge to the Surface Bus Facility at the Transbay Terminal Site would be via an exclusive bus/carpool lane on Fremont Street, and bus access back to the bridge from the bus plaza would be use a new, exclusive bus roadway located on the surface above the CalTrain subway box heading south to the Essex Street I-80 freeway on-ramp. There would be signalized intersections at all locations where the bus roadways cross existing streets.

It is projected that AC Transit buses would have an annual reduction of some 10,800 revenue-vehicle miles of operation under this option due to the direct nature of the access and exit routes and the one-level facility design. However, surface operation (even though in exclusive lanes on Fremont and over the train subway) through signalized intersections, when compared with the existing grade-separated operations, is expected to result in an overall annual increase of some annual 7,700 revenue hours of operation. The anticipated annual cost increase for this operation is $216,000.

The CalTrain Terminal station shell is proposed for midday bus storage until the full CalTrain extension is completed, so deadheading miles, hours, and costs for AC Transit are not expected to change in the short-term from existing operations.

In the long term, once the CalTrain Extensions Alternative is completed, buses would be stored off-site at either the 7th and Townsend or 16th and Owens sites, with operating cost implications as identified for Option C.

6.3.5 Transit Impacts Summary

In terms of operating costs and efficiency, the New Surface Bus Facility at the Main-Beale Site (Option C) has the greatest and most adverse long-term impacts on transit services, followed by Option D. Under Option C, AC Transit would experience considerable increases in operating expenses, with annual increases in costs estimated at $1.14 million for Option C1 and $1.89 million for Option C2. Although this represents less than one percent of the District's 1994 total operating budget, any cost impacts are important for a district that has been reducing service in recent years due to budget constraints. Annual increases for Option D are expected to be $216,000 for on-street operations plus some $692,000 for deadheading costs in the long term, representing an annual cost increase just over $900,000. Option D has the short-term benefit of providing on-site storage of buses until completion of the CalTrain Extension project and the long-term benefit of constructing a portion of the CalTrain Extension project.

Transit impacts are least for Options A and B due to the grade-separated bus access between the Bay Bridge and the replacement terminal and the on-site storage of bus during the midday.

AC Transit has provided the following requests regardless of the option selected[1]:

- Bus storage be provided equal to the existing storage,
- Travel time and mileage not increase over existing operations,
- Maintenance levels remain the same as at the existing Transbay Terminal,
- A supervisor facility exist to oversee transit operations at the new terminal, and
- A supervisor facility exist to oversee transit operations at any offsite storage facility in San Francisco.

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[1] Transmittal from Paul Bignardi, AC Transit Research and Planning to ICF Kaiser Engineers, August 8, 1996.

The following assumptions have been made for Golden Gate Transit regardless of the option selected:

- Golden Gate Transit will operate from the existing bus storage yard located on Folsom Street between Spear and Main streets,
- Golden Gate Transit Civic Center routes will operate inbound on Folsom Street and outbound on Howard Street,
- Under Options A and B, Golden Gate Transit routes may not serve the four bays allotted to Golden Gate Transit within the bus terminal, thereby possibly reducing deadhead and revenue miles. Golden Gate Transit will provide, to the extent possible, a level of service similar to or better than existing operations.
- Golden Gate Transit will serve the new bus terminal with bus stops that are adjacent to, or if possible, within one-half block walking distance.
- Golden Gate Transit patrons will have convenient use of those passenger amenities provided in a new bus terminal.
- Functional, aesthetically pleasing on-street amenities (e.g., shelters and benches) will be provided for Golden Gate Transit stops that serve the new bus terminal, and these amenities will be maintained by the operator of the new terminal.
- Golden Gate Transit will be provided with approximately 500 feet of curb frontage for the afternoon weekday commute operations. Actual stops may extend over a few blocks.

6.4 IMPACTS ON VEHICULAR TRAFFIC

6.4.1 Travel Time Impacts in Downtown San Francisco

Traffic analyses for the downtown San Francisco traffic study area (Figure 3.2-2) included the effects of the four mitigation options proposed to address demolition of the Transbay Terminal as described in Section 6.2.

Effects on vehicular travel time on streets in the downtown San Francisco traffic study area from the CalTrain Extension and the proposed bus terminal mitigation options are projected to be very slight. The average vehicular travel speed in the AM peak hour is projected to be 14 mph under the No-Build and bus mitigation Options A, B, and C (both routing options) and 13 mph under Option D. The average travel speed in the PM peak hour is projected to be 13 mph under all options except Option C2, under which the average speed is projected to be 14 mph.

Average travel speeds and the corresponding travel times on individual streets are projected to vary somewhat with the bus mitigation options. Ten key street segments were analyzed within the study area in the vicinity of the Transbay Terminal during the AM and PM peak hours. Generally, travel speeds would be slightly lower or occasionally the same under all mitigation options compared to the No-Build Alternative, with these exceptions:

- In the PM peak hour, Harrison Street would experience some slight increases in speed under Options B, C and D. Howard Street would experience some slight increases in speed under Options A, B, and D, as would Market Street eastbound between Second and Main under Option D.

- In the AM peak hour, Harrison Street would experience a slight increase in speed under Option A. Under Option D, Market Street (eastbound between Second and Main) and Beale Street would experience some slight increases in speed.

Speed changes are projected to occur because of a combination of modifications to traffic lanes and bus routes as well as changes in traffic patterns.

The speeds given reflect normal traffic conditions. Under incident conditions on the Bay Bridge, speed could be significantly lower. (See discussion of incident conditions under Intersection Level of Service Impacts.) The mitigation options would have little effect on vehicular speeds under incident conditions. For example, in the 2010 PM peak hour, the speed under non-incident conditions on First Street between Market and Harrison Streets is projected to be 13 mph under the No-Build Alternative and 11 and 12 mph under Options A and D, respectively, but would drop to two mph under incident conditions.

6.4.2 Vehicle Miles Traveled (VMT) Impacts in Downtown San Francisco

VMT impacts on the surface streets in the downtown San Francisco traffic study area are projected to be negligible (See Section 5.19.3 for corridor level VMT impacts). Increases of about 100 to 250 VMT or about one percent are projected for the downtown study area surface streets during the 2010 AM peak hour for bus mitigation Options A, B, and C. Option D is projected to decrease the VMT in the AM peak hour by 350 to 400. In the 2010 PM peak hour, Options A, B, and C are projected to increase VMT by about 100 or less, while Option D is projected to decrease VMT by about 700. Because the study area does not include the ramps on I-80 connecting with the Peninsula and therefore ignores the reduced VMT of some commuters diverted from auto to CalTrain, the VMT increases within San Francisco are likely overstated.

6.4.3 Intersection Level of Service Impacts

Normal Traffic Conditions

The City of San Francisco considers operational impacts on signalized intersections "significant" when project traffic causes level of service (LOS) to deteriorate from LOS D or better to LOS E or F. Table 6.4-1 presents the projected LOS conditions for the 33 study intersections during the AM and PM peak hours for the mitigation options for replacement of the Transbay Terminal.

Table 6.4-1
Signalized Intersection Delay (sec/veh) and LOS Summary, Year 2010 AM and PM Peak Hour

INTERSECTION	AM PEAK														PM PEAK													
	NO BUILD		OPTION A		OPTION B		OPTION C				OPTION D				NO BUILD		OPTION A		OPTION B		OPTION C				OPTION D			
							Original		Revised		Scenario 1		Scenario 2								Original		Revised		Scenario 1		Scenario 2	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Battery & Bush	44	E	55	E	44	E	53	E	---		47	E	48	E	52	E	45	E	51	E	47	E	---		44	E	49	E
2. Market & Fremont	8	B	7	B	8	B	8	B	---		7	B	7	B	9	B	7	B	8	B	9	B	---		8	B	10	B
3. Market & Beale	6	B	6	B	6	B	6	B	---		6	B	6	B	9	B	8	B	8	B	7	B	---		8	B	8	B
4. Mission & First	12	B	16	C	19	C	19	C	---		15	C	13	B	8	B	11	B	10	B	10	B	---		9	B	8	B
5. Mission & Fremont	8	B	10	B	9	B	10	B	---		10	B	10	B	10	B	8	B	9	B	9	B	---		5	B	6	B
6. Mission & Beale	9	B	11	B	10	B	11	B	---		10	B	10	B	7	B	12	B	7	B	8	B	---		8	B	8	B
7. Mission & Main	8	B	9	B	9	B	9	B	---		10	B	9	B	11	B	11	B	11	B	12	B	---		11	B	12	B
8. Howard & Second	5	A	6	B	5	A	5	A	---		7	B	7	B	12	B	13	B	12	B	12	B	---		11	B	12	B
9. Howard & First	9	B	11	B	10	B	10	B	---		10	B	10	B	11	B	11	B	13	B	12	B	---		11	B	12	B
10. Howard & Fremont	8	B	10	B	10	B	10	B	---		20	C	19	C	9	B	9	B	8	B	9	B	---		9	B	9	B
11. Howard & Beale	6	B	7	B	6	B	7	B	N/A	C	6	B	6	B	4	A	5	A	4	A	7	B	N/A	C	4	A	4	A
12. Howard & Main	7	B	5	A	5	A	5	A	N/A	A	5	B	5	A	12	B	14	B	13	B	8	B	N/A	B	14	B	14	B
13. Folsom & Second	10	B	10	B	9	B	9	B	---		10	B	9	B	12	B	12	B	13	B	12	B	---		12	B	12	B
14. Folsom & Essex (1)	0	A	5	A	4	A	4	A	---		5	B	5	A	0	A	2	A	2	A	2	A	---		4	A	4	A
15. Folsom & Fremont	34	D	28	D	33	D	35	D	---		30	D	33	D	11	B	10	B	10	B	10	B	---		10	B	10	B
16. Folsom & Beale	17	C	9	B	24	C	21	C	N/A	D	14	B	10	B	8	B	10	B	9	B	9	B	N/A	D	10	B	9	B
17. Folsom & Main	9	B	8	B	10	B	10	B	N/A	C	8	B	7	B	4	A	6	B	5	B	5	A	N/A	B	5	A	5	B
18. The Embarcadero & Folsom	17	C	16	C	18	C	11	B	---		17	C	17	C	15	B	16	C	13	B	15	B	---		14	B	14	B
19. Harrison & Essex St	7	B	10	B	9	B	10	B	---		10	B	10	B	11	B	15	B	12	B	15	C	---		20	C	18	C
20. Harrison & First	7	B	6	B	6	B	6	B	---		6	B	6	B	7	B	6	B	6	B	6	B	---		6	B	6	B
21. Harrison & Fremont	9	B	9	B	9	B	9	B	---		9	B	9	B	4	A	5	A	4	A	4	A	---		5	A	4	A
22. The Embarcadero & Harrison	7	B	7	B	7	B	6	B	---		7	B	7	B	11	B	11	B	10	B	11	B	---		11	B	11	B
23. Third & Townsend	12	B	12	B	12	B	12	B	---		---		---		27	D	27	D	27	D	27	D	---		---		---	
24. Fourth & Townsend	12	B	12	B	12	B	12	B	---		---		---		13	B	13	B	13	B	13	B	---		---		---	
25. Fifth & Townsend (1)	9	B	13	B	13	B	13	B	---		---		---		81	F	11	B	11	B	11	B	---		---		---	
26. Third & King	27	D	27	D	27	D	27	D	---		---		---		40	D	40	D	40	D	40	D	---		---		---	
27. Fourth & King	15	B	15	B	15	B	15	B	---		---		---		13	B	13	B	13	B	13	B	---		---		---	
28. Fifth & King	---		14	B	14	B	14	B	---		---		---		---		17	C	17	C	17	C	---		---		---	
29. Beale & I-80 Bus ramp	---		---		---		1	A	---		---		---		---		---		---		3	A	---		---		---	
30. Fremont & Bus terminal (2)	---		---		---		---		---		1	A	1	A	---		---		---		---		---		9	B	9	B
31. First & Bus terminal (2)	---		---		---		---		---		7	B	6	B	---		---		---		---		---		8	B	7	B
32. Howard & Essex (2)	---		---		---		---		---		3	A	4	A	---		---		---		---		---		3	A	4	A
33. Bryant & Beale	---		---		---		N/A	B	N/A	C	---		---		---		---		---		N/A	C	N/A	D	---		---	

(1) Unsignalized Intersection Until the Project Scenario (2) New Signalized Intersections Under the Project Scenario Scenario 1: Caltrain Not in Operation Scenario 2: Caltrain in Operation

Source: Korve Engineering, Inc.

The levels of service shown in Table 6.4-1 reflect normal traffic conditions. Incident conditions are discussed at the end of this subsection. As Table 6.4-1 indicates, there would be no "significant" LOS impacts as a result of the bus mitigation options for either the AM or PM peak periods. For example, the only intersections projected to have LOS in the range of D or worse with any mitigation option are Battery/Bush, Folsom/Fremont, Folsom/Beale, Third/Townsend, and Third/King. Among these intersections, there is only one instance where a mitigation option is projected to cause an intersection to change from its No-Build LOS: Folsom/Beale is projected to decrease from LOS C to LOS D under Option C2. All of the other intersections are projected to stay at their No-Build LOS: Battery/Bush would remain at its No-Build LOS of E, Folsom/ Fremont at LOS D (AM peak only), Third/Townsend at LOS D (PM peak only), and Third/King at LOS D. The Folsom/Fremont and Third/Townsend intersections would remain at LOS B in the peak period not cited.

From Table 6.4-1 for the AM peak hour, levels of service at most intersections under most options would remain the same or improve compared to the No-Build Alternative, with the exceptions projected to be First/Mission (for all options but D, long term), Howard/Second (for Options A and D), Howard/Fremont (for Option D), Howard/Beale (for Option C2), Folsom/Essex (for Option D, short term), Folsom/Beale (for Option C2), and Folsom/Main (for Option C2). Options C2 and D are thus projected to cause slight degradations in LOS more frequently than other options, as would be expected from the increased surface street bus operations for these two options.

With few exceptions, the PM- peak hour level of service at all intersections would also tend to remain the same or improve compared to the No-Build Alternative. For example, Option C2 is projected to cause slight increases in delay at three intersections. Other options are projected to cause only one or two increases in intersection delay. Therefore, the bus mitigation options are not expected to result in any serious effects on downtown San Francisco intersection traffic operations, and only slight differences are projected among the bus mitigation options.

None of the analyzed intersections would deteriorate from an acceptable level of service (LOS D or better) to an unacceptable level of service (LOS E or F) under any of the bus terminal mitigation options. Under future year 2010 conditions, only the intersection of Battery Street and Bush Street would be operating at an unacceptable LOS during the AM and PM peak hours. However, this situation would not be the result of project-related traffic, but rather of expected background traffic growth in downtown San Francisco. As a result, none of the proposed bus terminal replacement options would result in substantial impacts to traffic operations.

However, to minimize bus delays on First Street under Option D, some improvement measures could be implemented. Under typical operating conditions, the bus terminal crossing at First Street would remain clear of queued vehicles which might extend from Howard Street. In some instances, due to fluctuations in traffic volumes, a queue could build up from Howard Street long enough to extend back to the bus terminal crossing. Due to the relatively long width of the bus terminal crossing area (approximately 200 to 250 feet), vehicles traveling along First Street might have difficulty judging the available storage capacity across the intersection some 200 to 250 feet downstream. Vehicles blocking the intersection of the bus terminal at First Street would cause additional delay for buses waiting to move across. To minimize the potential for vehicular blockage of the intersection (bus terminal crossing) by queued vehicles extending back from Howard Street, the following measures are recommended for Option D:

- Utilize differential pavement treatment (i.e., color, texture) along the length of First Street at the bus terminal crossing to clearly indicate to drivers the zone/area of the bus terminal crossing. This treatment would provide a clear visual message to drivers that the area should be kept clear so that buses may cross.

- Install advanced pavement loop detectors on First Street upstream of Howard Street at Natoma Street to detect the length of queue from Howard Street. Also install traffic responsive control devices along First Street at Howard Street, at the bus terminal crossing, and at Mission Street. These three intersections would operate under a pre-set time control plan unless queues along First Street extend beyond Natoma Street, blocking the bus terminal crossing.

  In this instance, the presence of the queue would be detected by the advance loop detectors placed at Natoma Street. Operations at these three interconnected intersections would then function under a modified timing control plan that would hold the green phase on First Street at Howard and show a red phase on First Street at the bus terminal and at Mission Street. In essence, the timing plan would provide enough extra green time on First Street at Howard Street to clear the queue at the bus terminal while holding all vehicles upstream from entering the bus terminal crossing area.

Incident Traffic Conditions

Given the high volume-to-capacity ratios estimated at downtown freeway on-ramps, LOS at intersections near those ramps would quickly deteriorate to less than acceptable conditions (LOS E or F) in the case of an accident, construction project, stalled vehicle on the Bay Bridge or on U.S. 101, or other conditions causing greater traffic volumes (on the freeway or on local streets) than under normal conditions. The San Francisco Department of Parking and Traffic (DPT) estimates that "incident" conditions occur in the evening peak period about 25 to 30 percent of weekday evenings, and less often in the morning commute period.

Table 6.4-2 illustrates the effect of incident conditions on 12 intersections most likely to be affected by backups from the Bay Bridge.

Table 6.4-2
Signalized Intersection Delay (sec/veh) and LOS Summary
Year 2010 - PM Peak Hour - With and Without Incidents

INTERSECTION	NO BUILD				OPTION D					
	No Incident		Incident		Scenario 1		Scenario 2		Incident	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Battery & Bush	52	E	229	F	44	E	49	E	116	F
2. Market & Fremont	8	B	10	B	8	B	10	B	10	B
4. Mission & First	8	B	165	F	8	B	8	B	95	F
5. Mission & Fremont	10	B	10	B	8	B	6	B	6	B
9. Howard & First	10	B	102	F	10	B	10	B	68	F
10. Howard & Fremont	9	B	69	F	8	B	9	B	95	F
15. Folsom & Fremont	11	B	27	D	10	B	10	B	10	B
20. Harrison & First	7	B	177	F	6	B	6	B	212	F
21. Harrison & Fremont	4	A	189	F	5	A	4	A	195	F
23. Fremont & Bus terminal (1)	---		---		9	B	9	B	9	B
24. First & Bus terminal (1)	---		---		8	B	7	B	57	E
26. Folsom & First	8	B	210	F	(2)		(2)		244	F

(1) New Signalized Intersections Under
(2) Not Evaluated under this Scenario

Scenario 1: CalTrain Not in Operation
Scenario 2: CalTrain in Operation

Source: Korve Engineering, Inc.

For eight of these intersection, LOS under incident conditions is projected to be much worse than for normal conditions with no incident. Of these eight intersections, half are projected to improve with the proposed project (Option D), three are projected to become marginally worse, and one intersection would not exist in the No-Build condition for a comparison. Thus the proposed CalTrain extension can be expected to have an overall neutral effect on the extreme congestion that results from Bay Bridge incidents.

Under an incident condition, however, queues along First Street would extend from the I-80 on-ramp past Market Street. In this situation, the potential exists for a constant queue along First Street at Howard Street to extend far enough upstream to block the bus terminal crossing for Option D. During severe congestion and breakdown of local street traffic operations, queued vehicles would occupy entire length of the blocks. Under ideal conditions, vehicles would not proceed across an intersection (i.e, the bus terminal crossing area) unless there is sufficient storage space on the other side, even if their approach is given the green light, thus preventing gridlock.

However, under incident conditions, when traffic congestion is severe, some vehicle operators may not follow such practice and could proceed across the intersection, blocking the cross-street traffic and creating gridlock. Under these conditions, it would be probable that some vehicles would proceed across the bus terminal area and become "trapped" in the middle of the intersection when their light turns red.

Thus, under incident conditions, the recommended improvement measures proposed for typical conditions under Option D would not be sufficiently effective. Traffic responsive signal control devices are not expected to be as effective under severe congestion where there would be no fluctuation in the downstream traffic. To keep the bus terminal crossing clear of queued vehicles during an incident condition, the following additional improvement measures are recommended for Option D:

- Assign parking control officers (PCOs) to keep the bus terminal crossing area clear and to ensure that cross-street bus traffic has the ability to pass through. This is currently done on a routine basis by the Department of Parking and Traffic, when traffic congestion in the downtown area is severe.

- Install a video camera system to observe the bus terminal area. The system would monitor traffic conditions at several key intersections adjacent to the bus terminal and relay information to a central location. In the event of a traffic incident resulting in severe congestion such that operations at the bus terminal would be affected, a dispatcher would send several PCOs to direct traffic at the affected intersections. The Department of Parking and Traffic is scheduled to receive funding from federal sources to implement a video camera network in downtown San Francisco.

6.5 IMPACTS ON PARKING

The potential displacement of parking supply is approximately the same for all bus terminal replacement options. Surface parking lots with a total of approximately 800-900 spaces would need to be acquired in the two blocks bounded by Main, Beale, Mission, and Folsom Streets. Under Options B and D, parking or other land uses could be placed on this property following completion of the bus facility on the Transbay Terminal Site. Figure 5.2-1 shows the locations of parking lots in the vicinity of the bus terminal replacement mitigation options.

With this loss of parking, vehicles previously bound for the displaced parking spaces would have to park in other parking facilities nearby or switch modes to transit. Based on a parking inventory, the current study area parking supply is at approximately 85 percent capacity during the weekday midday. As a result of the reduction in parking spaces, area parking usage could reach well over 90 percent capacity during the weekday midday. Given the first-in first-served nature of parking, with early morning commuters able to park closer to their destination, loss of area parking would mean that vehicles arriving later would have to park further away from their destinations. The loss of parking could also deter additional commuters from driving, with a probable increase in public transit use.

San Francisco has a “transit first” policy, and the displacement of automobile parking spaces is generally not considered an impact requiring direct mitigation. Potential economic and fiscal impacts of parking displacements are discussed in Section 6.11.

6.6 IMPACTS ON NON-MOTORIZED TRAFFIC

The four bus facility replacement options would be located in the same generalized area south of Market Street and roughly between Main and First Streets. Pedestrian traffic would gain access to the bus facilities from the Financial District crossing Market Street at various cross streets, while South of Market pedestrian traffic would walk along Mission, Howard, and Folsom Streets or would traverse these streets using cross streets from the Embarcadero to Fourth or Fifth Streets.

Potential pedestrian impacts associated with bus facility replacement options include:

- The Main-Beale site would increase walking distances compared with the Transbay Terminal site because of its further distance from Market Street;
- The potential exists for increased pedestrian-bus conflicts at the proposed surface bus facilities (Options C and D) whether temporary or permanent. Impacts of the temporary Surface Bus Facility at the Main-Beale site would be of limited term in comparison to the potential long-term impacts of the permanent surface facilities under Options C and D.

The provision of grade-separated pedestrian structures in the immediate vicinity of the bus facilities, as proposed, would reduce some of the potential pedestrian/vehicle conflicts. Passageways under consideration include:

- Optional underground moving walkway from the east end of the underground CalTrain Terminal to the Embarcadero Muni/BART station.
- Underground walkway between a new bus facility at the Main-Beale site to the underground CalTrain Terminal. (This walkway would also connect to the optional passageway to the Embarcadero Muni/BART station.)
- Escalators and elevators to the various levels of the Bus and Train terminals.

The *Destination Downtown*[2] report noted that pedestrians tend to jay walk where sidewalks are constricted by physical barriers such as kiosks, newspaper vending machines, and the like. Keeping such amenities in and around the proposed bus facility property out of pedestrian flow could help reduce the tendency to jay walk.

6.7 IMPACTS ON LAND USE

Bus facility mitigation options would not in and of themselves introduce new land uses in the area but would reconfigure and/or relocate the existing (Transbay Terminal) land use, potentially allowing the existing Transbay Terminal site to be available for other uses.

Relocating the existing bus terminal within the immediate area is supported by the City and County of San Francisco as a means to encourage development in the area. Maintaining a regional bus terminal for downtown access and as a focal point for transit activity (e.g., intermodal connections) is consistent with the City's current land use policies and plans. Policy 5 of the San Francisco *Downtown Plan*[3], Moving To and From Downtown, would "provide for commuter bus loading at off-street terminals..." and Policy 6 would "make convenient transfers possible by establishing common or closely located terminals for local and regional transit systems." A transit terminal(s) is indicated in the plan for the area between Market Street and Folsom Street.

Ongoing planning efforts in the area have included establishment of the Transbay Redevelopment Survey Area. The survey area is comprised of 182 acres bounded roughly by Market, Second, Bryant, and Spear Streets. Land uses within the area are planned to be primarily commercial north of Howard Street, with mixed residential and commercial uses south of Howard Street. An open space network is planned in the area once occupied by elevated ramps of the Terminal Separator Structure (old Route 480), and Folsom Street is proposed as a widened boulevard.[4]

A new bus facility adjacent to or above the downtown CalTrain terminal would be expected to have varying beneficial impacts on existing and planned land uses depending upon the bus facility option.

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[2] San Francisco Planning Department, *Destination Downtown, Streetscape Investments for a Walkable City, The Downtown Streetscape Plan, Draft for Citizen Review*, August 1994.

[3] An Area Plan of the General Plan of the City and County of San Francisco, San Francisco Planning Department, no date.

[4] *Transbay 2020 Concept Plan*, Review Edition, by the San Francisco Redevelopment Agency, the San Francisco Planning Department, and Simon, Martin-Vegue, Winkelsteing, and Moris (SMWM), September 1996.

6.7.1 Option A - New Bus Terminal Building at Main-Beale Site

On March 4, 1996, the San Francisco Board of Supervisors adopted the Main-Beale location as its preferred site for a downtown regional bus facility. Among the reasons was the Main-Beale location is viewed by the City as the most consistent with current land use and economic development policies.[5] (See Section 10.1.4 for a summary of additional reasons for the City's stated preference.) The removal of the existing bus terminal, the west loop ramps along Essex Street and the east loop ramps between Folsom and Mission Streets would open up substantial space for new development. The new underground CalTrain terminal would have some structures at surface level to provide ticketing, information and other passenger services. These facilities could, potentially, be integrated into other development projects to be built on the surface above the train terminal.

A Main-Beale terminal would lessen the physical and visual barrier to north-south development created by the existing Transbay Terminal. Because the proposed terminal under Mitigation Option A would cross Howard Street, it could introduce a new visual barrier if not designed with sensitivity to visual impacts. Because the Main-Beale site is farther south than the existing bus terminal, it could serve as a transitional area between the office/commercial district to the north and the residential and industrial/mixed use areas to the south.

6.7.2 Option B - New Bus Terminal Building at the Transbay Terminal Site

Construction of a new bus terminal building on the existing Transbay Terminal site would retain access ramp structures along Essex Street but remove the existing ramps between Folsom and Howard Streets and the east loop ramps connecting to the present terminal. Considerable space would become available for new development. The new terminal would still be aligned east-west and remain somewhat of a barrier slowing new development to the south, although the perceived barrier effect could be mitigated by sensitive design. Land use impacts would not differ substantially whether a short or medium terminal configuration is considered at this location, except that the medium configuration would involve bridging-over Fremont Street in addition to First Street (similar to the existing Transbay Terminal).

A major land use benefit of Replacement Option B is that all of the property at the Main-Beale site for proposed use by the bus facility under Options A and C would be available for development if the new bus terminal were built above the CalTrain terminal at the Transbay Terminal Site.

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[5] San Francisco Planning Department, "Transbay Area Plan: Issues and Opportunities, June 1996.

6.7.3 Option C - Permanent Surface Bus Facility at Main-Beale

A surface bus terminal at Main and Beale Streets would, like Option A, open up areas now occupied by the existing terminal structure and ramps for new development. A surface facility would include minimal or no room for retail uses as would be provided for in the Option A or B building structures.

6.7.4 Option D - Permanent Surface Bus Facility at Transbay Terminal Site

The construction of a surface lot at the Transbay Terminal site would allow removal of the existing ramps between Folsom and Howard Streets and the east loop ramps connecting to the present terminal like Option B; in addition, the existing Essex Street ramps would be removed. This would allow considerable space to become available for development. The surface bus plaza, oriented east-west, would continue the physical barrier to north-south development; but the visual barrier would be reduced substantially from the current structure.

Like Option B, all property at the Main-Beale Site for the proposed use by the bus facility under Options A and C would be available for development. Like Option C, a surface facility would allow little or no room for retail uses as could be provided in Option A and B building structures. There would be limited opportunity to integrate the site with adjacent commercial development.

Mitigation

Bus facility mitigation options would themselves mitigate a potentially severe land use impact attributable to the CalTrain Extension Alternative (i.e., loss of the Transbay Terminal facility and functions), and would thus have a beneficial impact on potential future land uses in the project area. When considered in the context of existing land uses, the bus facility mitigation options would reorganize and/or relocate existing land uses (including potential development sites), and no additional mitigation is therefore proposed.

6.8 DISPLACEMENTS AND RELOCATION

6.8.1 Impacts

All four bus mitigation options would result in the acquisition and long-term displacement of nonresidential land uses on the Main-Beale site. Although not located on the Main-Beale site, a New Bus Terminal (building or plaza) at the Transbay Terminal Site would still require a temporary surface facility on the Main-Beale Site, leading to necessary property acquisitions on this site.

Table 6.8-1 lists the location, size, and existing use of properties potentially displaced. These locations were identified on the basis of conceptual engineering drawings of possible bus facility and ramp configurations, including right-of-way requirements.

As shown in the table, up to four businesses, varying from restaurants to parking lots (with an estimated 27 employees) would be affected by either of the Main-Beale Options (A or C). This includes one inactive business and a restaurant/bar on land owned by the State of California. Two potential property acquisitions on Folsom Street may not be required, depending upon the ultimate width and configuration of the bus access ramps. Options B and D would displace one office/service business and a parking lot.

All four options would potentially displace parking facilities on existing public rights-of-way. The State of California (Caltrans) owns these areas and provides short term leases (less than five years duration and renewable) to private companies for fee parking. Termination of these leases would result in the displacement of five business with an estimated 14 employees.

Parking or other land uses could be placed on the Main-Beale site following completion of a bus facility at the Transbay Terminal site under options B or D.

6.8.2 Mitigation

All owners of potentially acquired properties and all businesses potentially displaced would be provided compensation and relocation assistance in accordance with State and Federal requirements, as discussed in Section 5.2.2.

6.9 SOCIOECONOMIC IMPACTS

6.9.1 Impacts on Population Groups

No existing or planned residential uses would be displaced by any of the bus terminal mitigation options. Options A and C, by placing the bus terminal at Main and Beale streets south of the existing site, would move it closer to existing residential uses in the South Beach area. The populations in these areas, according to available Census information and projections from ABAG, are not disproportionately made up of particular ethnic or low income groups, but are generally representative of City populations overall.[6]

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[6] Existing populations on average have slightly higher incomes than the City median and lower concentrations of ethnic and racial groups.

Table 6.8-1:
Estimated Non-Residential Acquisitions and Displacements for Bus Mitigation Options

Bus Mitigation Option	Number of Properties Affected	Total Estimated Land Area in Square Feet	Total Estimated Building Square Feet	Number of Businesses by Type				Estimated Employees Displaced
				Office/ Business Services	Restaurant/ Bar	Parking	Vacant Structure	
A. New Bus Terminal at Main-Beale [1]	4	37,060	65,900	1	1	1	1	27
B. New Bus Terminal at Transbay Terminal	2	21,870	7,700	1		1		15
C. Surface Bus Facility at Main-Beale [1]	4	37,060	65,9000	1	1	1	1	27
D. Surface Bus Facility at Transbay Terminal Site	2	21,870	7,700	1		2		15
All Options: Leased Fee Surface Parking	5	153,200	4			1		14

[1] Two of the four properties are optional acquisitions that depend upon the design of the bus access ramps.

Adopted land use plans support further residential development in the South Beach area. Bus terminal mitigation options would not directly conflict with such development. Depending upon the configuration option (multilevel versus surface lot) and the extent of services that would be provided, the bus terminal at Main-Beale Streets could provide local population as well as pedestrian-serving retail and commercial uses. Based upon these considerations, no adverse impacts on populations in the area are anticipated.

6.9.2 Impacts on Neighborhoods and Businesses

Residential neighborhoods in the immediate vicinity of proposed sites for the bus terminal mitigation options are not yet well established. As noted, the major residential uses are to the south, and mixed use office/retail/commercial/industrial activity characterizes most of the area potentially affected by bus facility options. The relocation of the bus terminal would not be expected to adversely affect neighborhood integrity or cohesion but instead, by opening up more space to development and redevelopment through the removal of physical barriers, may facilitate the implementation of local neighborhood plans.

A number of businesses would be displaced by the bus terminal options. The loss of up to nine businesses with an estimated 41 employees would adversely affect economic activity in the short term. Long-term impacts would result if the businesses decided not to relocate in the area or within the City and County of San Francisco. Five of the businesses potentially affected are fee parking operations on Caltrans right-of-way, employing an estimated 14 full-time equivalent employees. It is anticipated that the additional space made available for retail, commercial and office development through the removal of segments of the bus access ramps would wholly or in major part offset the direct loss of displaced businesses.

6.10 IMPACTS ON COMMUNITY FACILITIES AND SERVICES

The bus terminal mitigation options would have no effect on the community facilities, community services, parklands, schools, and churches identified in Sections 4.3 and 4.4. The only community facility affected would be the existing Transbay Terminal itself, and the only community service affected would be transit services, as described in Section 6.3, above.

6.11 FISCAL/ECONOMIC IMPACTS

Replacement of the Transbay Terminal would have impacts on the City and County of San Francisco's economy. Impacts would be due to a number of factors, including construction-related employment from the project, disruptions experienced by businesses during construction of the project, and the loss of parking. Additionally, there would be long-term positive economic benefits as a result of the CalTrain extension, which are addressed briefly in Section 5.6.

6.11.1 Effects on Government Services

With the exception of transit services, which are discussed in Section 6.3, no government services would be directly affected by the proposed mitigation options. The new bus terminal is not expected to increase demand on police and fire prevention services operated by the City and County of San Francisco. System security for a new bus terminal would continue to be the responsibility of Caltrans or whomever is the developer or owner of the new facility. San Francisco provides fire protection service to the existing terminal, so service to a replacement terminal would not represent an increase in service.

6.11.2 Effects on Government Revenues

Table 6.11-1 presents estimated losses of tax and other revenues to the City and County of San Francisco associated with the demolition of and mitigation measures for the Transbay Terminal. A total fiscal loss of $557,000 to the City and County of San Francisco's General Fund is projected as a result of terminal mitigation. A broad framework of tax revenues collected by the City and County of San Francisco for Fiscal Year 1994-95 is described in Chapter 5, as are the methodologies employed in generating estimated fiscal losses.

Table 6.11-1
Transbay Terminal Mitigation Options
Fiscal Costs To The City and County of San Francisco

Revenue Source	Annual Revenue Loss
Property Tax (1)	($66,000)
Sales and Use Tax (2)	($48,000)
Payroll Expense and Business Tax (3)	($12,000)
Parking Tax (4)	($431,000)
TOTAL FISCAL COST TO GENERAL FUND	**($557,000)**
Total 1991 Tax Revenues for City and County of San Francisco = $943,000,000	**0.0006 of total revenue**

Notes:
1. Property tax losses are estimated for properties on Main, Mission, and Folsom Streets.
2. Sales and use tax loss is estimated for a business located on Main Street.
3. Based upon payroll expense and business tax estimates for 1 business and 850 parking spaces. Total number of employees estimated by Dun and Bradstreet. Annual employee wages estimated by assigning SIC codes for: Home furnishings, and Eating and Drinking Places. Annual wages for these employment classifications provided by U.S. Department of Commerce, "1992 County Business Patterns." A 1.5 percent payroll tax was then applied to the total payroll expenses. Business tax for the partial parking lot loss was estimated at the rate of $3.00 per every $1,000 in annual gross receipts.
4. Assumes a $6/day flat rate for 850 parking spaces, with 100 percent occupancy five days a week and 75 percent occupancy two days a week, over a 52-week period. A 25 percent parking tax rate was then applied to the total gross revenues.

Sources: Office of the Controller, City and County of San Francisco; U.S. Department of Commerce, "1992 County Business Patterns;" Building Owners and Managers Association International, "1995 BOMA Experience Exchange Report;" Dun & Bradstreet; State Board of Equalization; Caltrans; De Leuw, Cather & Company; ICF Kaiser Engineers, and Sedway Kotin Mouchly Group.

Either the new bus building or surface terminal at the Main-Beale site (Mitigation Options A and C), would require the acquisition of four private properties for public use, including 800-900 parking spaces. Mitigation Option B and D would require the same property acquisitions as Options A and B, with the exception of the two optional acquisitions required for the bus ramp under Mitigation Options A and C. Under Mitigation Option B and D, property acquired between Main and Beale streets for a temporary surface bus facility could be returned to other new land uses or the current uses following completion of a new bus facility at the Transbay Terminal site. Fiscal impacts of these acquisitions are summarized below.

Property Tax. Implementation of the Main-Beale mitigation options entail public acquisition of four properties, resulting in an annual reduction of $66,000 in property tax revenues to the City and County of San Francisco.

Sales and Use Tax. Of the four properties to be acquired for the Main-Beale mitigation options, only one business currently is active and generating sales tax. The displacement of this business, assuming it does not relocate elsewhere within San Francisco, would result in a loss of annual sales tax revenues of approximately $48,000.

Payroll Expense and Business Tax. In addition to the displacement of the one sales tax-generating business mentioned above, the acquisition of a 800-900 parking spaces would also result in lost payroll expense and business tax revenues. An estimated $12,000 currently generated in payroll expense and business taxes will be lost, assuming that these businesses do not relocate in San Francisco.

Parking Tax. Implementation of the Main-Beale mitigation options would require the acquisition of 800-900 parking spaces. Parking tax revenue losses associated with this decrease are estimated to be $441,000 if the autos parking in the spaces do not park in similar lots.

Other Fiscal Losses. Currently, the Transbay Terminal houses several small retail businesses, including a cocktail bar, a barber shop, a shoe service, and a snack shop. Greyhound Bus Lines and a tour guide service are also located in the terminal building. Demolition of the terminal and the displacement of these businesses represents additional sales, payroll, and business tax losses. It is possible that some of these businesses may relocate to the newly built terminal building, potentially mitigating any adverse fiscal impacts.

Fiscal Benefits. Although demolition of the Transbay Transit Terminal and the various mitigation measures proposed entail a variety of tax revenue losses to the City and County of San Francisco, there are fiscal benefits to be considered as well. The construction of a new bus facility would create opportunities for joint development and new commuter-oriented retail, resulting in future sales tax dollars. Option A, the Main-Beale three-story bus terminal, and Option B, the three-story bus terminal at the current Transbay site, both allow for up to 35,000 to 50,000 square feet in ground floor terminal retail. Applying an estimated annual sales per square foot ratio of $250, retail sales in the new terminal could generate between $8.75 million and $12.5 million in gross sales annually. This would in turn generate $109,375 in annual sales tax revenues to the City and County of San Francisco's General Fund.

6.11.3 Regional Economic Impacts

The demolition and reconstruction of the Transbay Terminal would create numerous economic impacts on the City and County of San Francisco. The most immediate impact would be construction-related employment generation, which is detailed for bus facility mitigation Option A in Chapter 5.

Business disruption during bus terminal demolition and reconstruction is another potential impact. Although it is not anticipated that neighboring businesses would experience major disruptions, unpleasant demolition and construction conditions (e.g., noise and debris) and temporarily limited vehicular access around the terminal site may diminish business activity in the area for a short time. This would result in some loss of revenues and a corresponding decline in local sales and use taxes and possibly payroll taxes. Assuming any such loss in local business activity would be replaced by increased activity elsewhere, the effects at the regional level would be minimal.

6.12 IMPACTS ON AIR QUALITY

Projects that would increase or decrease the total vehicle miles traveled in a neighborhood or region have the potential to increase or decrease the total quantities of motor-related pollutants emitted. Within the area surrounding the proposed CalTrain terminal, however, the differences in daily vehicle miles traveled under each bus facility mitigation option would not be sufficient to cause a measurable change in the projected daily local emissions burden (tons per day) of any of the pollutants analyzed, including reactive organic gas (ROG), carbon monoxide (CO), nitrogen oxide (NOX), sulfur oxide (SOX), and particulate matter (PM10).

Future emissions from automobile traffic were projected using two computer models, as described in Section 5.7. Both methodologies use existing and future traffic volumes, roadway geometry, meteorological conditions, and CO emission factors to estimate CO emissions at representative intersections, including the intersections of Fremont and Folsom Streets, First and Howard Streets, Fremont and Mission Streets, and First and Mission Streets. Analysis results using both methodologies are provided in Table 5.7-2, which shows that no exceedences of the 1-hour or 8-hour CO standards are anticipated as a result of the project.

Modeling results varied slightly between bus facility mitigation options, no doubt due to slight differences in projected future traffic volumes and congestion at these intersections. As a result, one hour CO concentrations would be up to 0.8 parts per million (ppm) less than shown in Table 5.7-2, and eight-hour CO concentrations would be up to 0.3 ppm less, depending on the option selected. None of the bus facility mitigation options would be consistently "better" at all locations, however, and the magnitude of variation is insignificant.

6.13 NOISE/VIBRATION

Automobile and diesel bus traffic is the primary source of noise in the vicinity of the existing Transbay Terminal, and would remain so under all bus facility mitigation options. As described in Section 5.8, traffic noise was assessed by comparing traffic volumes on local streets under the Build and No Build Alternatives, and by calculating the change in noise that would result from any change in traffic volumes. Table 5.8-2 contains a partial list of the streets and intersections that were included in the traffic noise assessment, including all those where the projected noise exposure increase was greater than 1 dB. (Each direction was analyzed independently to make sure that noise impact from traffic increases in one direction were not obscured by a smaller change in the opposite direction.) Results show the projected traffic volume for each option and noise exposure increase.

Modeling results varied slightly between bus facility mitigation options, no doubt due to slight differences in projected future traffic volumes and congestion. As a result, projected noise levels would be marginally less under some bus facility mitigation options at various locations. None of the bus facility mitigation options would be consistently "better" at all locations; and the magnitude of variation is minimal, with the greatest variation of 1.4 dB and most other variations less than 0.5 dB.

An area of concern is along Essex Street between Folsom and Harrison Streets where a residential complex is located. Noise from traffic traveling between the new bus facility and the freeway would increase 2 dB over the No Build Alternative; however, noise from the I-80 ramps would continue to dominate the area and the effect of the bus facility traffic would be minimal. As with other street segments, the options vary less than 0.5 dB in this area.

Noise from buses operating on ramps associated with the bus facility mitigation options would be generally consistent with existing noise levels associated with buses using elevated ramps connected to the Transbay Terminal. With the Surface Bus Facility at the Main-Beale Site, there would be one exception to this statement, and buses using the ramp to and from grade could contribute to somewhat higher noise levels than existing. No residential receptors have been identified in the vicinity of this potential ramp, and the increased noise levels would likely be noticeable to only those most familiar with the area.

6.14 GEOLOGIC/SEISMIC IMPACTS

All of the bus terminal mitigation options would be subject to the same soils and seismic concerns as were described in Section 5.9 for the proposed CalTrain terminal itself. A new bus terminal, whether at the Transbay Terminal site or the Main-Beale site, would be an improvement over the existing terminal in terms of its ability to meet current structural and seismic design standards. Design and construction of the new bus terminal to current codes and standards is expected to mitigate the potential geologic and seismic impact to the extent currently possible, and no additional mitigation is proposed.

6.15 IMPACTS ON WATER RESOURCES

Piles used to support a new bus terminal building at the Main-Beale site could potentially create a conduit for downward migration of shallow contaminated groundwater. However, the Bay Mud is likely to form an effective seal around the piles, thereby minimizing impacts to deeper groundwater zones. Potential impacts of a new bus terminal building at the Transbay Terminal site would be the same as described for the CalTrain terminal itself in Section 5.10. There would be no impacts on water resources attributable specifically to a new surface bus facility at the Main-Beale or Transbay Terminal sites.

6.16 IMPACTS ON UTILITIES

The permanent surface bus facility at the Main-Beale site would have only minor effects regarding utility relocation, however a new bus terminal building could affect the 3 foot by 5 foot brick sewer along Howard Street. Mitigation for impact to utilities is described in Section 5.12.5. No additional utility relocation would be required for a bus terminal building on top of the proposed underground CalTrain station at the Transbay Terminal site.

6.17 ELECTROMAGNETIC FIELD IMPACTS

Electromagnetic fields (EMF) are associated with the catenaries used to power Muni's electric buses and light rail vehicles and the proposed CalTrain Extension for the electrified portion. Although there would be minor differences in the direction and range of EMFs from the bus replacement options, differential EMF effects are expected to be negligible. The links between EMFs and health effects remain inconclusive.

6.18 IMPACTS ON HISTORIC AND CULTURAL RESOURCES

The Transbay Terminal and the terminal loop ramp, which are contributory elements of the NRHP-eligible San Francisco-Oakland Bay Bridge, would be displaced by the underground CalTrain terminal proposed as part of the CalTrain Extension Alternative. This would constitute an adverse effect under Section 106 of the Historic Preservation Act (see Section 5.14). No other NRHP-eligible or potentially eligible historic structures would be affected by the bus terminal replacement options. Four historic archaeological sites that may be located near or within the site of the present Transbay Terminal or along Beale Street could be affected by one or the other replacement site option. The reader should note that locations designated for these sites in the historic literature are speculative, and deposits -- if they exist -- could easily be located a block or two away from the traditional "location" as cited in the Archaeological Survey Report (Chavez, 1996). Specific sites associated with either proposed bus facility location are described below.

Mitigation measures would consist of pre-construction subsurface testing to be followed by data retrieval in accordance with an approved Data Recovery Plan as described in Section 5.14.1.2.

6.18.1 Option A: New Bus Terminal Building at the Main-Beale Site

Site 12 (sloop or schooner/Life C. Watts shipyards/industrial ironworks), presumed to be located on Beale Street, north of Folsom Street, could be affected by bus terminal construction at this location. Remains of the vessel have never been found and the actual location could be within the proposed area south of Howard Street. If maritime remains are present, the potential for NRHP eligibility is high and pre-construction testing would be warranted. The shipyards and ironworks are likely located farther south and would not be affected by replacement terminal construction.

Site 13 (ship or brig, unnamed), presumed to be located east of Beale Street, between Folsom and Howard Streets, could be located within the Terminal site and subject to potential impacts. If maritime remains are present, the potential for NRHP eligibility is high and pre-construction testing would be warranted.

Site 14 (Risdon Iron Works), enclosed by Howard, Main, Folsom, and Beale Streets, could be encountered during replacement terminal construction. NRHP-eligible features associated with this site have already been discovered at this location and the potential for other deposits to be NRHP-eligible is high. Pre-construction testing would be warranted.

Site 18 (Main Street Wharf), on Main Street, between Folsom and Mission Streets, could be affected by bus terminal construction. If wharf remains are encountered, the potential for NRHP eligibility is high and pre-construction testing would be warranted.

6.18.2 Options B and D: New Bus Terminal Building at the Transbay Terminal Site

Potential impacts to Sites 17, 20, 21, 22, 23, and 24 could result from construction of the underground CalTrain station at the Transbay Terminal site; these sites and impacts are described in Section 4.16 and 5.14. No additional impacts to historic archaeological resources would result from further construction of a replacement bus terminal on this site. Construction of the temporary surface lot at Main and Beale Streets under this option would result in less soil disturbance and thus fewer potential impacts to subsurface deposits at this location than would Option A.

6.18.3 Option C: New Surface Bus Facility at Main-Beale Site

Potential impacts to historic archaeological resources would be similar to those for the temporary surface lot, depending upon the amount of soil disturbance required.

6.19 HAZARDOUS MATERIALS IMPACTS

There would be no differential impacts of hazardous materials sites associated with long-term operation of the different bus facility mitigation options. Hazardous materials sites impacts related to construction are discussed in Section 6.24.14.

6.20 IMPACTS ON THE VISUAL/AESTHETIC SETTING

The existing bus ramps and Transbay Terminal building are noticeable visual elements in the project area. Principal new visual features introduced into the area under bus facility mitigation options include a new terminal building (Options A & B), bus ramps (Options A, B, C1), and optional pedestrian over passes. These features are described below for each mitigation option, with particular attention to structures that pass over streets, since these structures would be most visible to area residents, employees, and visitors and have the greatest potential to affect long-range views.

6.20.1 Long-Term Visual Changes

Visual changes would occur in the general vicinity of the existing Transbay Terminal and the Main-Beale site under all bus facility mitigation options, and these changes could be quite noticeable in some locations, under some options, as described below. The number of buildings that would pass over streets, restricting long-range views, would remain the same or decrease when compared with existing conditions, however, and the area covered by elevated ramps and pedestrian overpasses would decrease.

Nonetheless, the new features introduced to the area could be somewhat larger than existing ramps and facilities, and would therefore be somewhat more intrusive. Architectural design and surface treatment of new facilities would improve their appearance, and lessen their bulky appearance. To further reduce the intrusiveness of new ramps and facilities, landscaping could be incorporated into the final design.

Buildings, Ramps, and Overpasses

Option A, a new bus terminal building at the Main-Beale site, would replace the existing bus facility with a new structure between Main and Beale Streets, from the rear of the Pacific Gateway Building (201 Mission Street) south to nearly Folsom Street. The new structure could be between 50 and 75 feet tall and extend over Howard Street. Elevated bus ramps, adjacent to the Fremont Street automobile off-ramp, would connect the new bus facility to the I-80 freeway. Essentially following the route of a portion of the existing west bus ramp, the new ramp would cross Essex, Harrison, Folsom, First, Fremont, and Beale Streets. Eight overpass structures would be visible, but this ramp would be adjacent and parallel to the I-80 Fremont off-ramp that would also cross these same streets, with the exception of Beale Street.

Option B, the new bus terminal building at the Transbay Terminal site, would replace the existing bus facility on its existing site, above the proposed underground CalTrain terminal. Similar to the existing facility, the "Medium" configuration would pass over First and Fremont Streets, and would be between about 50 and 60 feet tall. Under the "Short" configuration, the new structure would pass over First Street only, and would be between about 60 and 85 feet tall. An elevated bus ramp would connect the new bus facility to the I-80 freeway. Essentially following the route of the existing bus ramp, the new ramp would cross Essex, Harrison, Folsom, Clementina, Tehama, Howard, and Natoma Streets. Nine overpass structures would be visible crossing a maximum of nine streets.

Option C, the new surface bus facility at the Main-Beale Site, would build a surface lot or one-story enclosure for buses between Main and Beale Streets, and between Howard Street and the rear of the Pacific Gateway Building (201 Mission Street), with another lot or enclosure on the opposite side of Howard Street. Pedestrian overpasses would cross over Howard Street and Beale Streets, joining both sides of the facility with the CalTrain terminal and the Beale-Fremont pass-through. For Option C1, an elevated bus ramp, adjacent to the Fremont automobile off-ramp, would connect the surface facility on Beale Street to the I-80 freeway. Essentially following the route of a portion of the existing bus ramp, the new ramp would cross Essex, Harrison, Folsom, First, and Fremont Streets. Seven overpass structures would be visible crossing a maximum of seven streets, but six of these streets would already be crossed by the I-80 Fremont off-ramp that is adjacent and parallel to these bus ramps.

For both Option C2 and D, the new Folsom Street auto ramp would be used, along with city streets, for access to the surface facilities. New bus ramps would not be constructed for either Option C2 or D.

Other Visual Changes

In addition to the obvious visual changes associated with the bus facility and elevated bus ramps, the mitigation options would result in less noticeable visual changes including changes in bus activity, catenary wires, signs, and landscape features. Under all options, "the hump" which currently accommodates surface transit access in front of the Transbay Terminal would be removed, and the associated landscaping and plaza could be eliminated. Bus access and public open space could be replaced on the same site, at the proposed Beale-Fremont pass-through, or on the Main-Beale site. Catenary wires for Muni electric coaches would be relocated to Beale and Fremont Streets as needed, and landscape features would be incorporated into the design of the terminal and associated spaces/features.

6.20.2 Changes to Scenic Views or Vistas

As described in Section 4.18, the existing Transbay Terminal area is visually diverse, containing a mix of building types and land uses. Residents, employees, and visitors to the area currently enjoy short- and long-range views, primarily with urban streetscapes in the foreground, and occasionally with the downtown skyline or the Bay in the background. Few of the available views would be considered "scenic" by most viewers, since they reveal elements of a developed, urban area. Nonetheless, views can be of interest, and can affect experiences or enjoyment of the area.

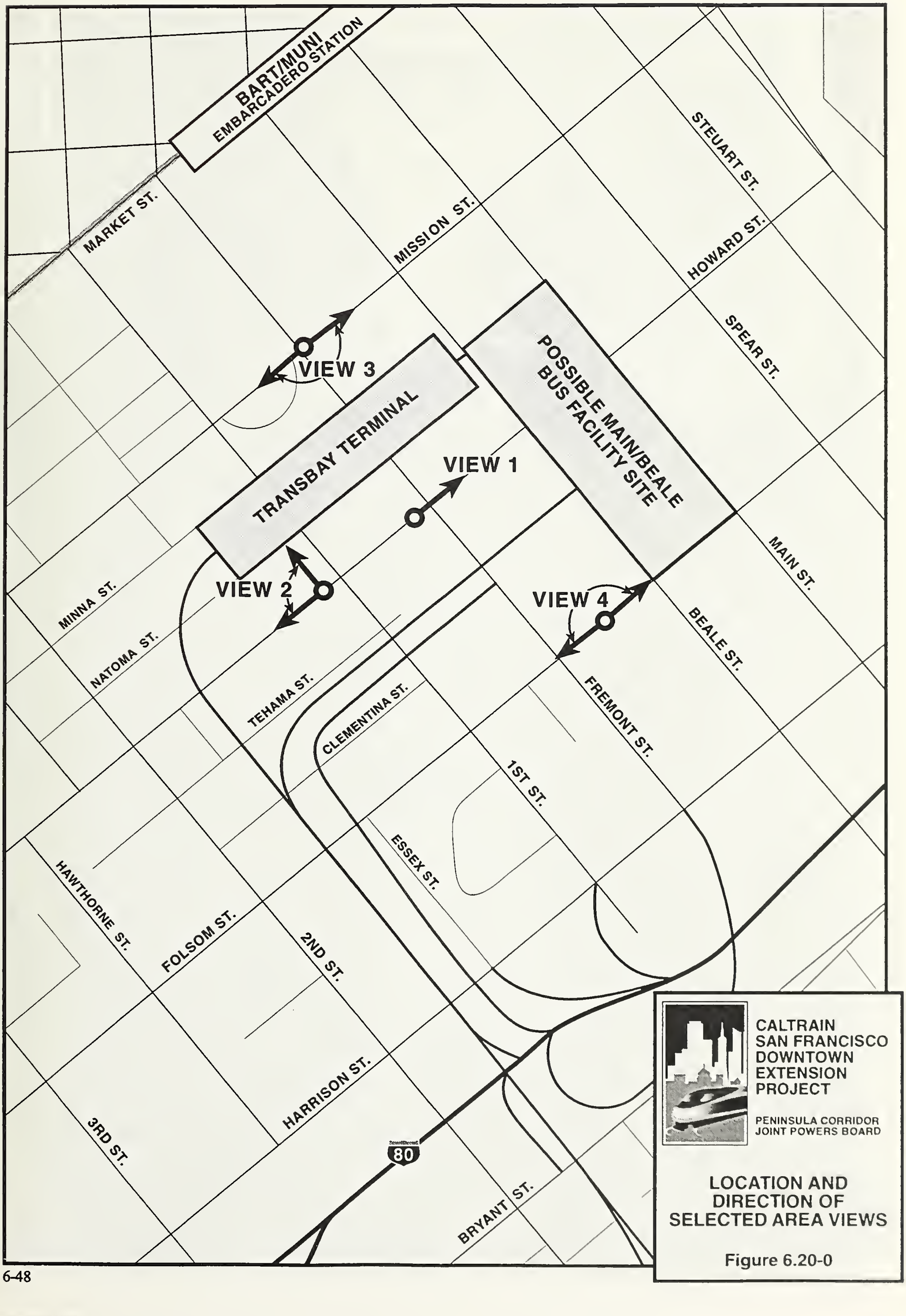
Four representative views were selected to describe changes that would occur as a result of the bus terminal mitigation options. The viewpoint, direction, and characteristics of these views are described in detail below, and viewpoints are shown in Figure 6.20-0. Where future views have been simulated, an effort has been made to show the size and location of project features, without conjecture about their final design and appearance, or potential future development that is not associated with the current project.

View 1: View From Howard Street Near First Street, Looking East

Under existing conditions, a pedestrian standing in the parking lane of Howard Street, looking east towards the Bay would see the street and automobile traffic in the foreground, buildings on both sides of Howard Street, and a bus ramp over Howard Street in the background. (See Figure 6.20-1.) A careful viewer, or one who was standing closer to Fremont Street, could see the Bay and an island in the distance, past the bus ramp, and would notice the buses parked, or "stored," on top of the ramp. An older red brick building at the corner of Howard and Fremont Streets conceals a portion of the ramp, although an opening to the left of the red brick building reveals a sign and lighting on the current bus ramp as it continues into the terminal building.

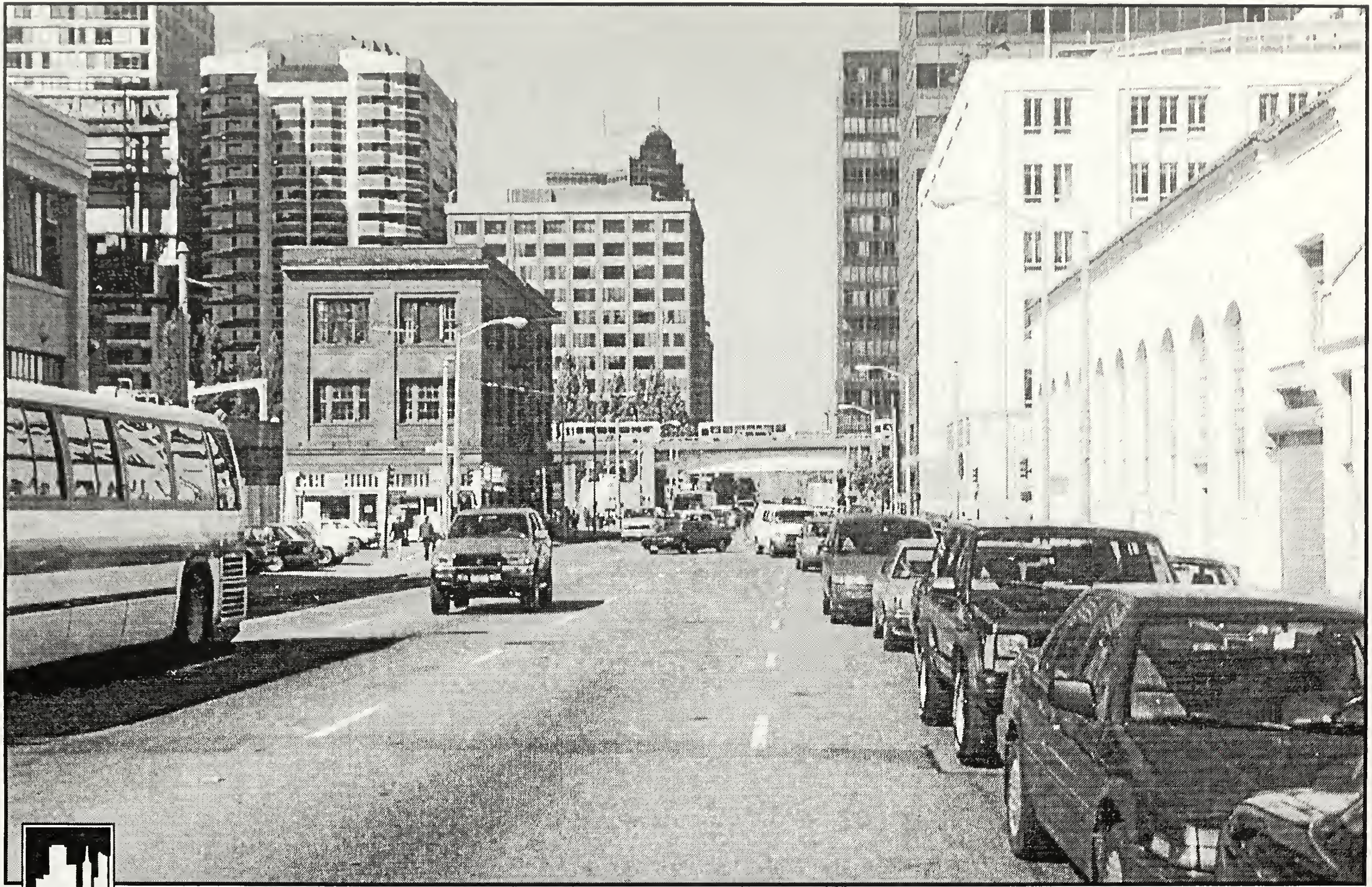
Under all bus facility mitigation options, this view would change. Under Options B and D, with the new bus facility at the Transbay Terminal site, the view would markedly improve due to removal of the existing bus ramp. With the bus ramp eliminated, the buildings lining Howard Street would create a strong, unobstructed view corridor towards the Bay. Under Option C, with the new surface bus facility at the Main-Beale site, the view would also be improved by removal of the bus ramp, although a pedestrian overpass could be constructed one block farther away, again obstructing the view corridor to some extent.

Under Option A, with the new bus terminal building at the Main-Beale site, the existing view would change dramatically, with elimination of the existing bus ramp, and its replacement with a much taller, and bulkier building (See Figure 6.20-2.). Though illustrated here with no architectural design elements or surface treatments that would moderate its appearance, the facility would clearly become a presence in the area, obstructing the view corridor, and adding a strong horizontal element. The height of the new building would be about the same as a six-story office complex. The Howard Street underpass would be taller than currently exists under the ramp structure, providing some view of the Bay; however, it would be more massive than the ramp structure, casting wider shadows onto Howard Street below.


BART/MUNI
EMBARCADERO STATION
MARKET ST.
MISSION ST.
STEUART ST.
HOWARD ST.
SPEAR ST.
VIEW 3
TRANSBAY TERMINAL
POSSIBLE MAIN/BEALE
BUS FACILITY SITE
VIEW 1
VIEW 2
VIEW 4
MAIN ST.
MINNA ST.
NATOMA ST.
BEALE ST.
TEHAMA ST.
CLEMENTINA ST.
FREMONT ST.
1ST ST.
ESSEX ST.
HAWTHORNE ST.
FOLSOM ST.
2ND ST.
HARRISON ST.
3RD ST.
80
BRYANT ST.
CALTRAIN
SAN FRANCISCO
DOWNTOWN
EXTENSION
PROJECT
PENINSULA CORRIDOR
JOINT POWERS BOARD

LOCATION AND DIRECTION OF SELECTED AREA VIEWS

Figure 6.20-0



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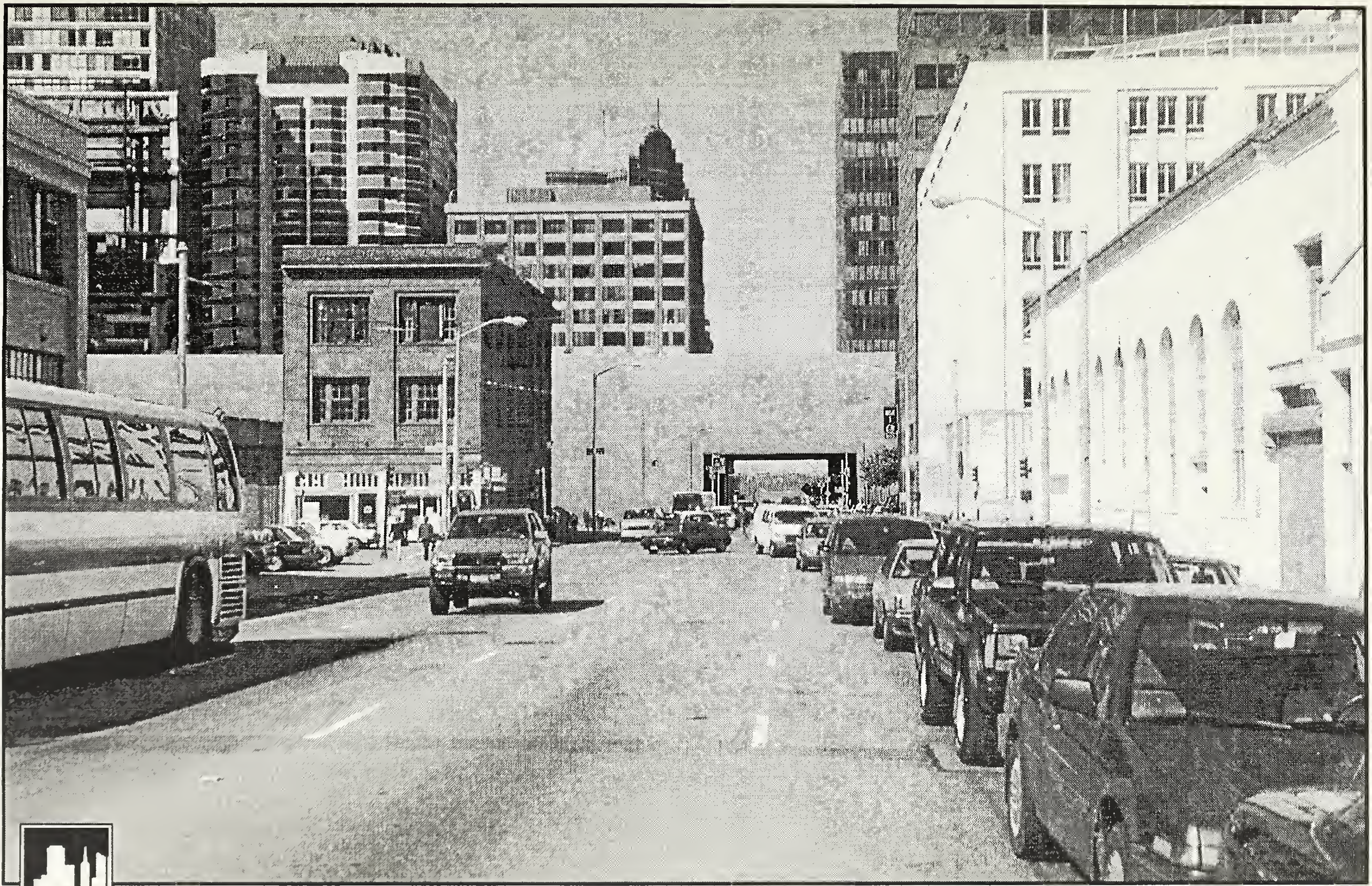
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 1: HOWARD ST., NEAR 1ST., LOOKING EAST, EXISTING CONDITIONS

Figure 6.20-1



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DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 1: HOWARD ST., NEAR 1ST., LOOKING EAST, OPTION A: BUS FACILITY AT MAIN-BEALE SITE

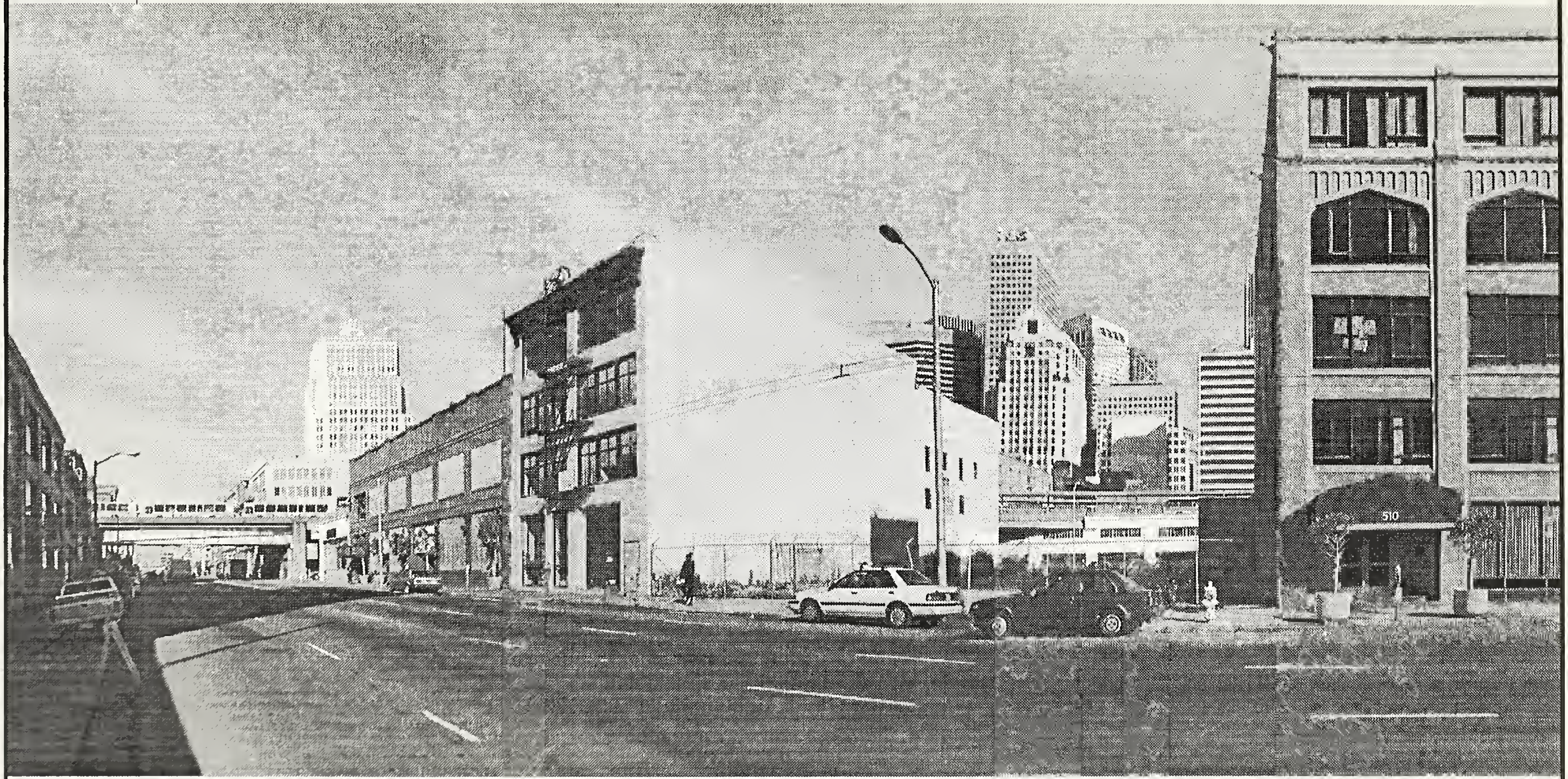
Figure 6.20-2

View 2: Howard Street Near 1st Street, Looking Southwest

Under existing conditions, a pedestrian standing in the parking lane of Howard Street, looking southwest towards Twin Peaks would see the street and automobile traffic in the foreground, buildings on both sides of Howard Street, and a bus ramp over Howard Street in the background. (See Figure 6.20-3.) A careful viewer could see the base of Twin Peaks in the distance, past the bus ramp, and would notice the buses parked, or "stored," on the ramp structure. Small commercial buildings on both sides of Howard Street conceal portions of the ramp, although to the right of the three buildings in the center of the view, a portion of the existing Transbay Terminal is visible, with the tall buildings of downtown San Francisco in the background. This view would change dramatically, regardless of which bus terminal mitigation option is selected. The three buildings in the center of this view would be removed to allow construction of the CalTrain subway tunnel, and the Transbay Terminal itself would be removed to allow construction of the new CalTrain terminal.

Other changes to this view would occur under all bus facility mitigation options. Under Options A and C, which would place the new bus terminal at the Main-Beale site, the bus ramp over Howard Street would be eliminated, opening up a view corridor along Howard Street. No ramp would exist under Option D, either.

Under Option B, which would place the new bus terminal on the Transbay Terminal site, the bus ramp over Howard Street would be replaced with a two-level ramp structure, and the new bus facility building would be constructed at the same location as the Transbay Terminal now occupies. (See Figure 6.20-4.) The new bus facility would be about as tall as a six or seven story office complex, and would be much more prominent than the existing terminal due to its height and to the removal of intervening buildings which currently obscure the view of the Terminal and ramp. Replacement buildings or uses on the site of buildings removed likely would occupy the foreground eventually.



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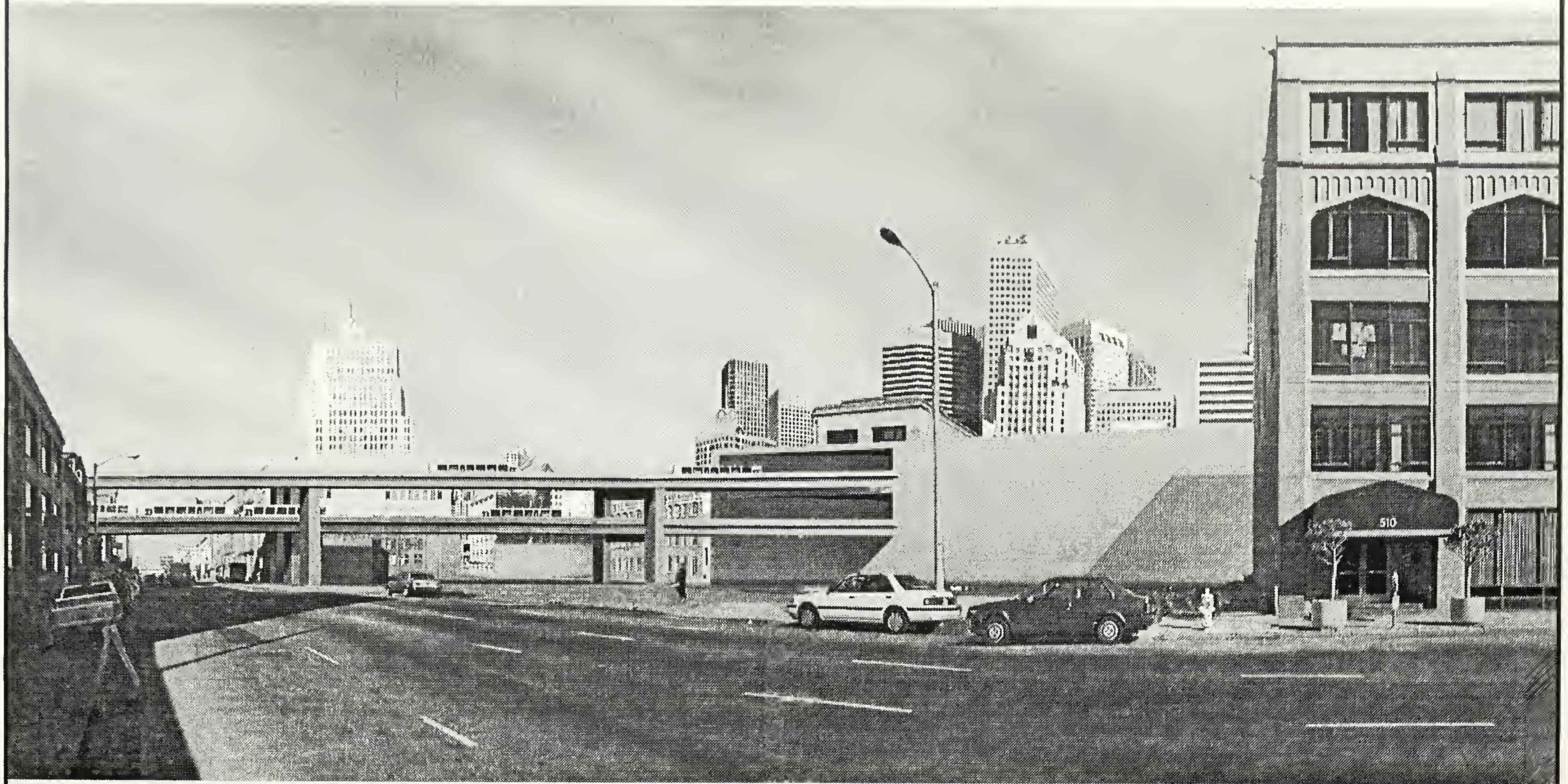
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 2: HOWARD ST., NEAR 1ST., LOOKING SOUTHWEST,
EXISTING CONDITIONS

Figure 6.20-3



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PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 2: HOWARD ST., NEAR 1ST., LOOKING SOUTHWEST,
OPTION B: BUS FACILITY AT THE TRANSBAY TERMINAL SITE

Figure 6.20-4

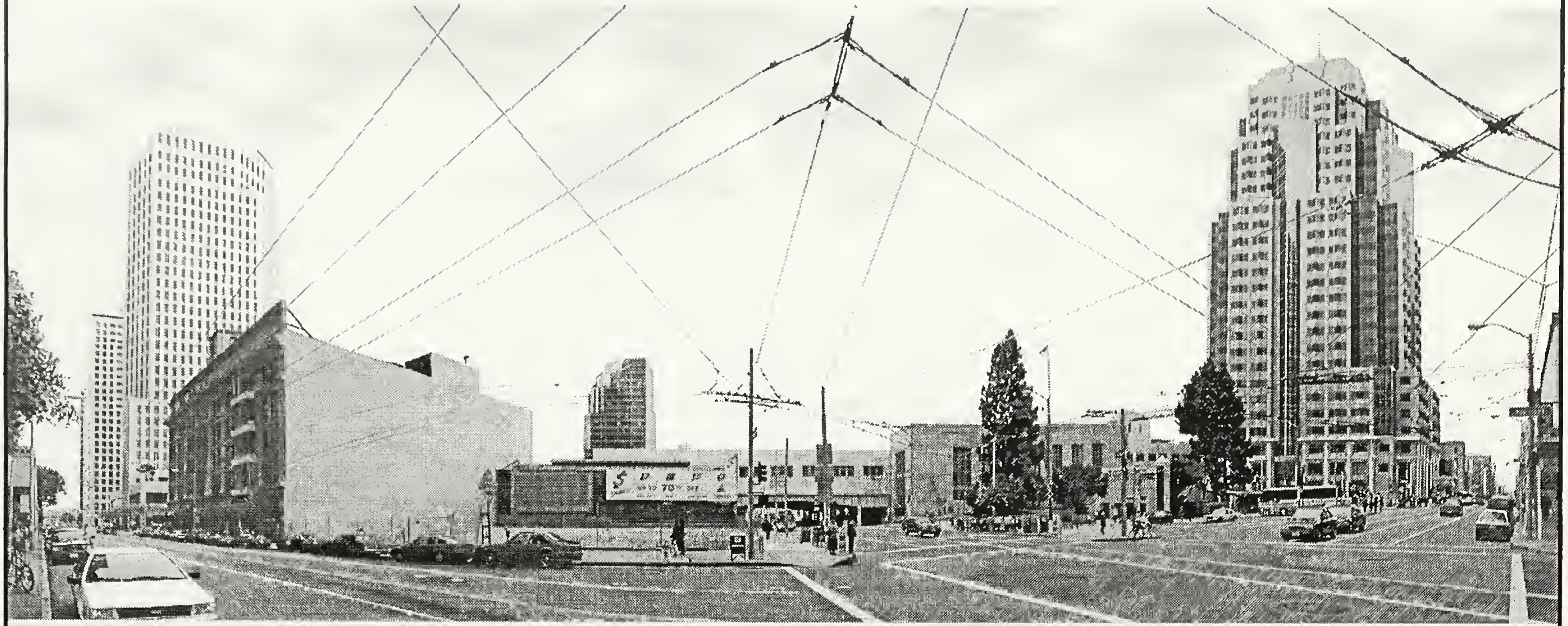
View 3: Mission Street at Fremont Street, Looking South Panoramic View:

Under existing conditions, a pedestrian standing at the northeast corner of Mission and Fremont Streets, looking up and down Mission Street would see the existing Transbay Terminal building across the street, spanning over Fremont Street, and a collection of taller buildings in the distance. Street traffic and catenary wires are visible, along with landscaping and transit vehicles on the "hump" in front of the Terminal building. (See Figure 6.20-5.)

For the bus facility mitigation options, this view would change dramatically, regardless of which option is selected, since the Transbay Terminal would be removed to allow construction of the new CalTrain terminal.

Other changes to this view would occur under all bus facility mitigation options. Under Options A and C, which would place the new bus terminal at the Main-Beale site, the Transbay Terminal site would be vacant, except for a small building providing stair and elevator access to the CalTrain terminal below. The configuration and appearance of other possible future uses or buildings on the site are not known at this time. Under Option D, a surface bus plaza would exist on the site. Thus options A, C, and D would eliminate the bulky Transbay Terminal building and open up views to the south.

Under Option B, which would place the new bus terminal on the Transbay Terminal site, a new bus facility would be visible in one of two configurations. With the "Short" configuration, the bus facility would not extend over Fremont Street, although pedestrian access could be provided via walkways over Fremont Street (see Figure 6.20-6). With the "Medium" configuration, the bus facility would extend across Fremont Street, similar to the existing Transbay Terminal building. (See Figure 6-20.7.) Under both configurations, the existing "hump" and landscaped plaza that form the front of the existing Transbay Terminal would be removed. The new bus facility would be about as tall as a six or seven story office complex, and particularly with the "Medium" configuration, would be more prominent than the existing terminal due to its height.



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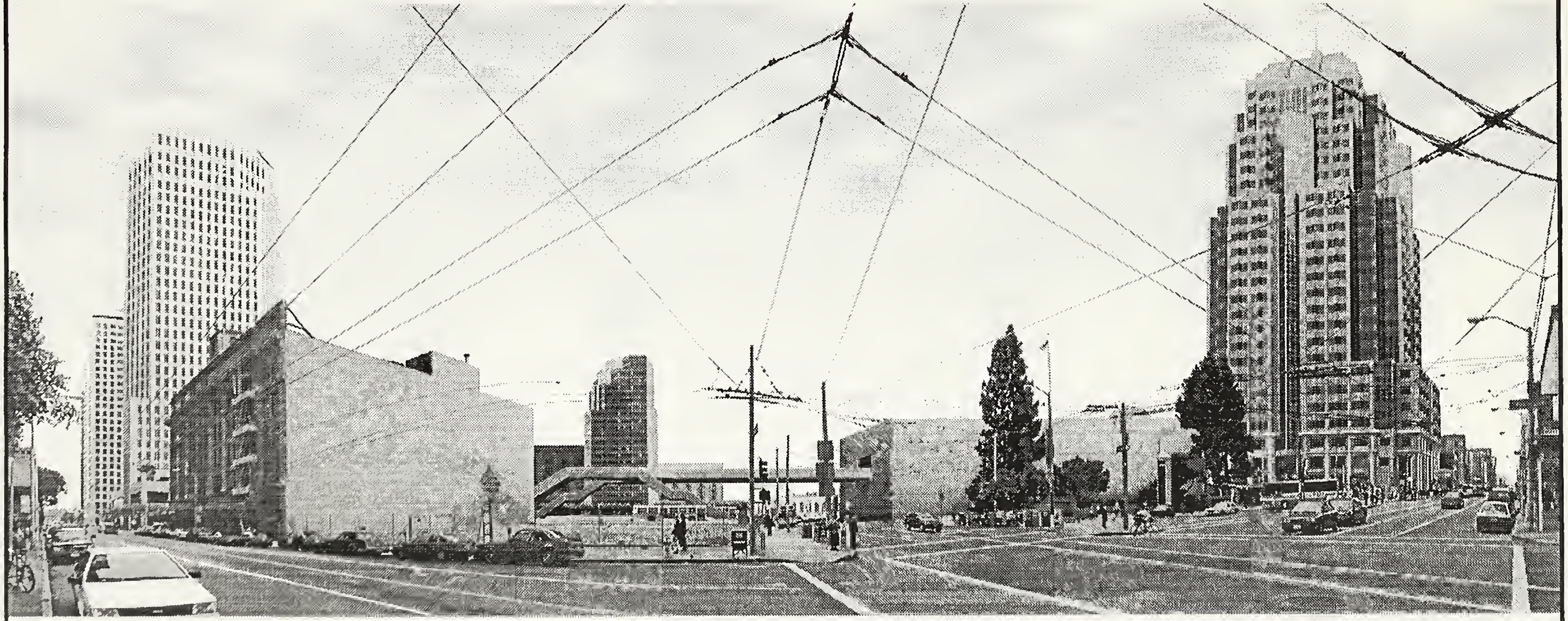
PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 3: MISSION ST., AT FREMONT ST., LOOKING SOUTH, PANORAMIC VIEW, EXISTING CONDITIONS

Figure 6.20-5



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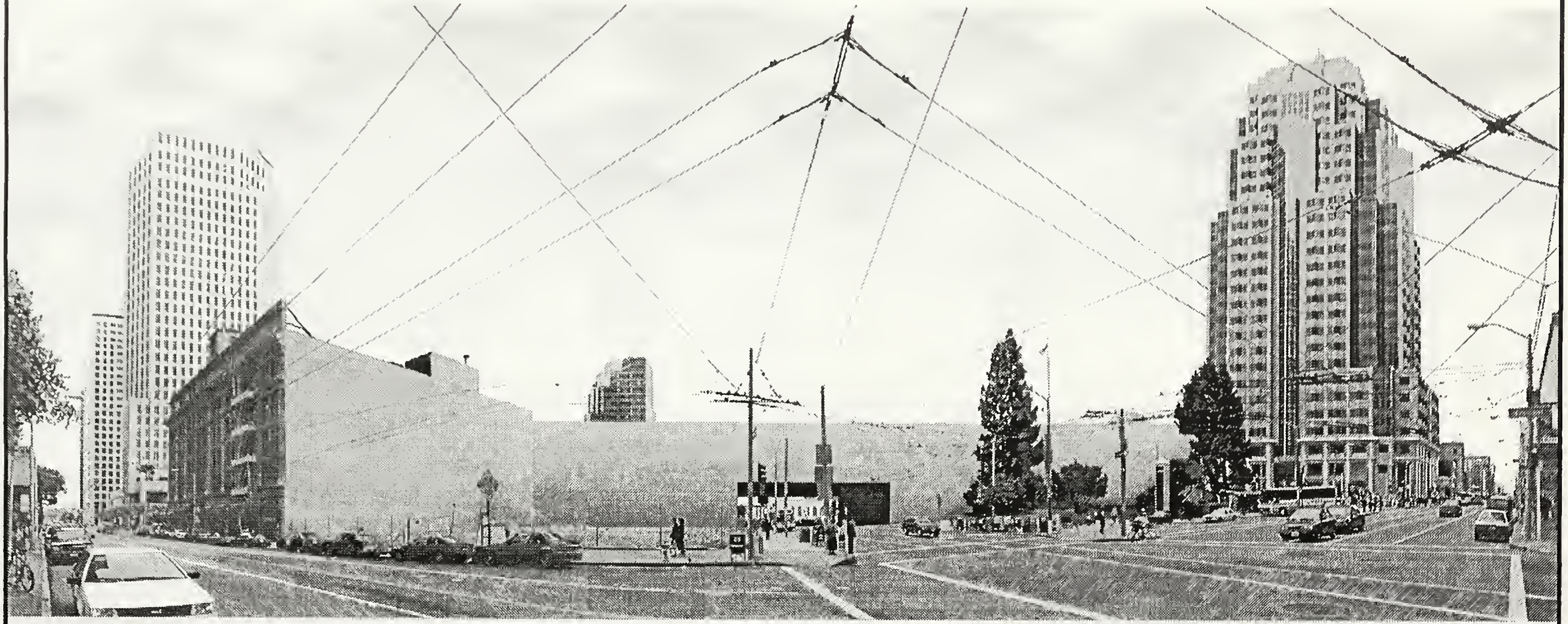
PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 3: MISSION ST., AT FREMONT ST., LOOKING SOUTH,
OPTION B: "SHORT" CONFIGURATION BUS FACILITY AT THE TRANSBAY TERMINAL SITE

Figure 6.20-6



CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 3: MISSION ST., AT FREMONT ST., LOOKING SOUTH,
OPTION B: "MEDIUM" CONFIGURATION BUS FACILITY AT THE TRANSBAY TERMINAL SITE

Figure 6.20-7

View 4: Panoramic View From Folsom Street Between Beale and Fremont Streets, Looking North

Under existing conditions, a pedestrian standing near the corner of Folsom and Beale Streets looking north would see parking lots in the foreground where the elevated Terminal Separator ramp structure used to be before it was removed following the 1989 earthquake. (See Figure 6.20-8.) Existing elevated bus ramps to the Transbay Terminal appear in the background, along with the Fremont Street automobile off-ramp, and associated landscaping (trees). Behind the ramps, utilitarian commercial buildings and high rise office towers of San Francisco's downtown are visible.

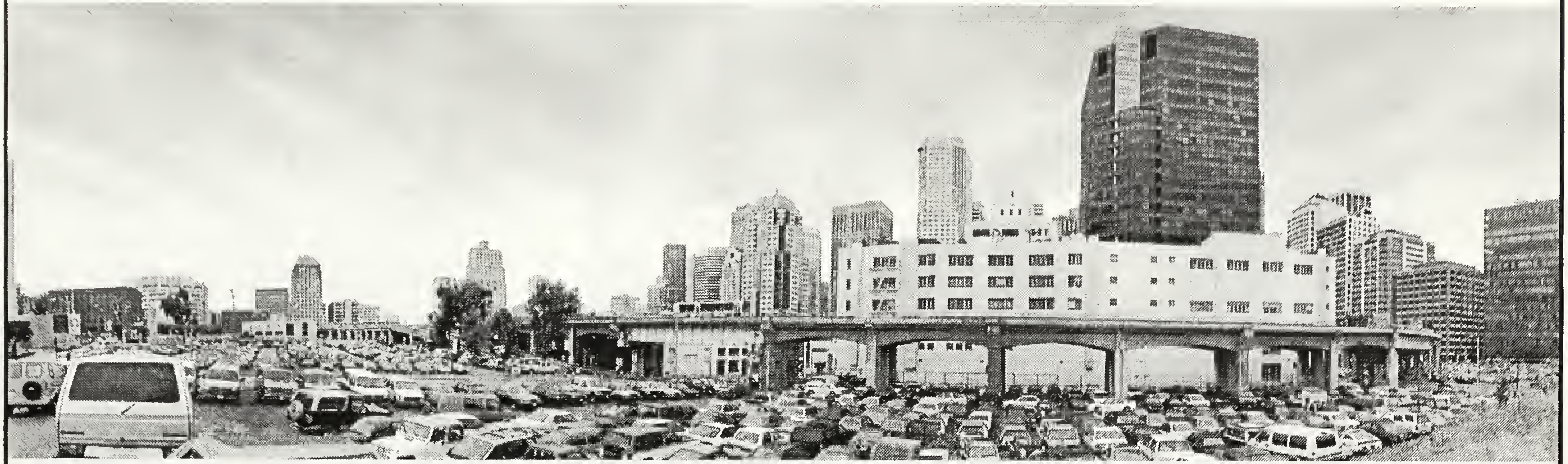
This view would change under all bus facility mitigation options. Under Option B and D, which would place the new bus facility on the Transbay Terminal site, the bus ramps would be removed, and no portion of the new bus ramps or bus facility would be visible. (See Figure 6.20-9.) Existing buildings in the background would be more apparent, and the only new visual element would be the modified Fremont Street automobile off-ramp, which is assumed to be constructed regardless of which alternative and mitigation option are selected.

Under Option A, which would place the new bus facility on the Main-Beale site, the existing bus ramp would be replaced with two ramps -- one for bus service to the lower level and one for service to the upper level. Both ramps would end at a new terminal building, visible across Beale Street. (See Figure 6.20-10.) The new bus ramps would represent a dramatic visual change, since they would be about twice as wide and twice as high as the existing ramps, increasing the shadows on the streets and parking areas they cross, and increasing the visual perception of the ramps as a barrier between one area and another.

New structures could be built between the new ramps and Folsom Street, reducing the overall visual impacts from this view perspective.

6.20.3 Shadow

While removal of the existing Transbay Terminal and associated bus ramps in the CalTrain Extension Alternative would reduce the total amount of shadow experienced on area streets and sidewalks, any of the three bus facility mitigation options would replace or even increase shadow in some locations. Under all three options, shading would be experienced to the north, east, and west sides of the new bus facility, and under new ramps and pedestrian overpasses. While pedestrian areas could be newly shaded at certain times of the day and year, no new shadow would be expected to reach any public open spaces under the jurisdiction of the San Francisco Recreation and Park Department.

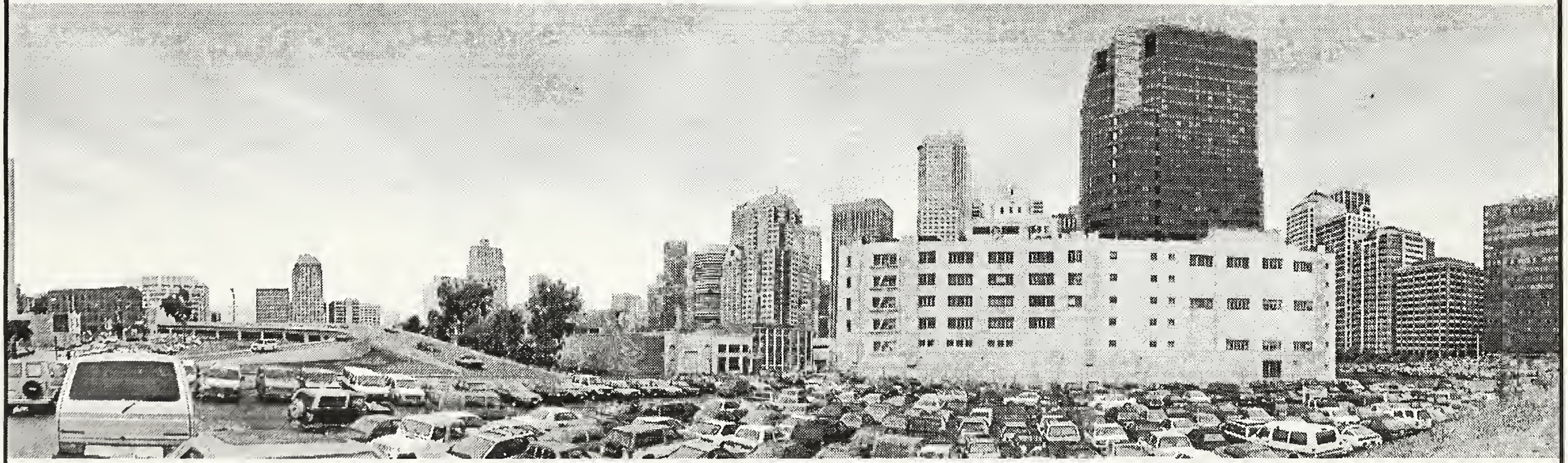


CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 4: FOLSOM ST., BETWEEN BEALE & FREMONT STREETS,LOOKING NORTH, PANORAMIC VIEW, EXISTING CONDITIONS

Figure 6.20-8

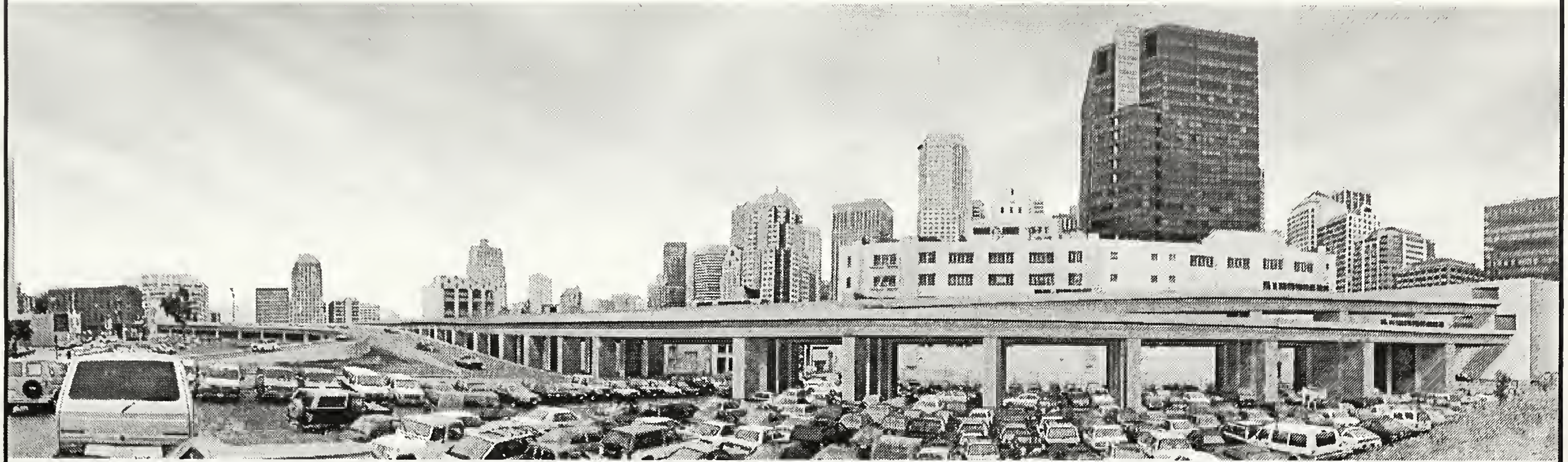


CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 4: FOLSOM ST., BETWEEN BEALE & FREMONT STREETS,LOOKING NORTH,
OPTION B: BUS FACILITY AT THE TRANSBAY TERMINAL SITE

Figure 6.20-9



CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

VIEW 4: FOLSOM ST., BETWEEN BEALE & FREMONT STREETS,LOOKING NORTH,
OPTION A: BUS FACILITY AT THE MAIN-BEALE SITE

Figure 6.20-10

6.20.4 Light and Glare

Under all bus facility mitigation options, lighting would be provided where streets would pass under the facilities, ramps, or pedestrian overpasses. Lighting associated with each facility would be directed towards the facility, and substantial "spill over" to adjacent areas is not anticipated.

6.21 IMPACTS ON SAFETY AND SECURITY

Passengers exiting the replacement bus terminal either at the present Transbay Terminal site or the Main-Beale site would be transferring to another form of public transit or walking to their destination. The bus facility would be lighted, include landscaped and/or fenced buffers from adjacent streets, and have designated walkways for pedestrians and sheltered boarding and alighting areas for bus passengers.

Bus passengers disembarking at the new bus terminal building at the Transbay Terminal site would go directly downstairs to the CalTrain underground terminal or would gain access to other public transportation via a possible underground concourse connecting to the Embarcadero BART/ Muni Metro Station. Bus passengers disembarking at the new bus terminal building at the Main-Beale site could walk to the underground CalTrain terminal via an underground concourse under Beale Street or to the Embarcadero BART/Muni Metro Station via a possible underground concourse. Bus passengers disembarking at a new surface bus facility (Options C or D) would be likely to cross more surface streets than passengers disembarking at a new building under either of the other replacement options and therefore would be slightly less safe. All bus passengers leaving either bus facility site and walking to their destinations would use existing sidewalks and crosswalks. Public safety would not be adversely affected by operation of a new bus facility at either of the proposed sites.

Security at the new bus terminal would be provided by Caltrans or the developer and operator of the new terminal. Security requirements at the new bus terminal likely would be similar to those at the present terminal (Caltrans owns and operates the existing Transbay Terminal but has indicated its desire not to continue in this role). Facility interiors for Options A and B would be open and clearly lighted and clear sight lines would be maintained. This would be an improvement over the existing facility. Public security would not be adversely affected by operation of a new bus terminal at either of the proposed sites.

Fire protection would be provided at the new bus terminal (Options A & B) by the San Francisco Fire Department. Fire sprinklers, stand pipes, smoke/gas detectors, and alarm systems would be placed throughout the facilities per City of San Francisco Fire Department requirements. New bus terminals would be an improvement over the existing terminal, as it would be built with state-of-the-art fire protection devices. Public fire safety would not be adversely affected by operation of a new bus facility at either of the proposed sites.

6.22 IMPACTS ON ENERGY

The added or reduced distances that buses would travel to reach a relocated or modified bus terminal would result in a corresponding increase or decrease energy consumption. This section provides estimates of potential energy impacts for each bus facility mitigation option.

6.22.1 Methodology

Analysis of energy impacts focused on operating energy only. Bus operations represent an ongoing activity that can be influenced by measures to improve efficiency and conserve energy. This approach is consistent with the energy analysis presented for CalTrain Extension alternative in Section 5.18.

Bus terminal mitigation options could change circulation patterns for Muni, AC Transit, SamTrans, and other buses that use the existing Transbay Terminal. Changes would only occur in the immediate vicinity of the Transbay Terminal. Operations elsewhere on the local, regional, or transbay routes serving the area should not be affected. For this reason, energy impacts described as the incremental change in bus fuel consumption due to changes in bus miles for each mitigation option (see Table 6.3-1). The baseline for comparison is the No-Build condition. Bus miles is a reasonable indicator of energy uses although a change in bus travel or idling time due to a change in speed or the duration of bus layover, respectively, could also affect bus operations energy consumption. Estimates are provided for the three public operators who are responsible for most of the bus activity at the existing Transbay Terminal.

6.22.2 Energy Consumption from Bus Operations

Table 6.22-1 summarizes estimated changes in energy consumption for each bus terminal option for each major transit operator. Increased energy consumption for revenue operation of diesel-fueled standard buses and electric-powered bus trolleys would be highest for Muni for the Beale Street Mall option. AC Transit is projected to incur increased energy consumption for revenue operations under Options A, B (medium configuration), and C2. Energy savings are projected for AC Transit under Options B (short configuration), C1, and D. SamTrans diesel bus fuel consumption would increase under Option A for the Beale Street Mall, but decrease due to reduced bus miles of travel for the other options. However, non-revenue deadheading of buses to a remote lot for midday storage would occur under Options C and D (long term), which would increase energy consumption.

Table 6.22-1
Incremental Energy Consumption for Bus Operations

Operator	Mode	Avg. Fuel or kWh per Veh. Mile	Total Energy in Btu's per Veh. Mile [1]	Annual Change in Vehicle Miles/Total Energy Consumed by Bus Facility Mitigation Option							
				A. New Structure at Main-Beale				B. New Structure at Transbay		C. Surface Lot at Main-Beale	
				Pass-Through		Beale St. Mall					
				Veh. Miles	Total Btu	Veh. Miles	Total Btu	Veh. Miles	Total Btu	Veh.. Miles	Total Btu
Muni [2]	Diesel Bus	0.33 gal	49,200	16,800	826,560,000	51,000	2,509,200,000	16,800	826,560,000	22,550	1,109,460,000
	Trolley Bus	5.0 kWh	51,300	16,800	861,840,000	51,000	2,616,300,000	16,800	861,840,000	22,550	1,156,815,000
SamTrams	Diesel Bus	0.33 gal	49,200	(1,900)	(93,480,000)	4,500	221,400,000	(1,900)	(93,480,000)	(1,900)	(93,480,000)
AC Transit	Diesel Bus	0.33 gal	49,200	11,000	541,200,000	11,000	541,200,000	(13,700)	(674,040,000)	(2,900)	(142,680,000)
Bus Storage [3]	Diesel Bus	0.33 gal	49,200					12,400	610,080,000	100,000	4,920,000,000
Total (Long Term):				42,700	2,136,120,000	117,500	5,888,100,000	30,400	920,880,000 [4]	140,300	6,950,115,000

(xx) indicates decrease or savings

Notes:

[1] Total energy includes generation and transmission for electricity and refining for diesel.

[2] Muni operates a combination of diesel and electric trolley buses, both standard length and articulated. Miles are assumed to be divided evenly.

[3] Midday storage of AC buses at a remote lot is required for the duration of construction under B. New Structure at Transbay Terminal (approximately five years) and indefinitely under C. Surface Lot at Main-Beale.

[4] Change in long-term energy consumption; in the short term, with deadheading to a surface lot during facility construction, annual energy consumption would increase by approximately 610 million Btu's.

Source: Nelson/Nygaard (vehicle miles); De Leuw, Cather & Company.

6.22.3 Mitigation Measures

To the extent possible, bus facilities would be designed to allow efficient movement of vehicles (and passengers) and minimize delays to operators due to added turns, longer travel distances, and increased dwell times.

6.23 CONSTRUCTION STAGING AND METHODS

Several types of construction activities would be required for the bus terminal mitigation options. Construction staging and methods are generally described in the following sections. Impacts associated with construction activities for the bus replacement facilities are described in Section 6.24.

6.23.1 Preconstruction Activities

For a discussion of preconstruction activities associated with the CalTrain Extension, see Section 5.20.1 and Table 5.20-1. Similar preconstruction activities would occur with the bus terminal mitigation options.

6.23.2 Property Acquisition and Building Demolition

Property acquisitions for the bus terminal mitigation options are discussed in detail in Section 6.8. A building on Main Street would need to be acquired and demolished for all bus terminal mitigation options. Buildings on Folsom Street may also need to be acquired and demolished for construction of bus ramps leading to a new bus terminal building or new surface bus facility at Main-Beale (Options A or C).

Building demolition would occur prior to initiation of new ramp and bus terminal or facility construction. Equipment typically involved in building demolition includes: crawler cranes, crawler dozer/loaders, pavement breakers, rubber-tired loader/bob cats, trucks, excavator/ backhoes, generator/ compressors, and water trucks for dust control.

6.23.3 Demolition of Bus Ramps

Table 6.23-1 summarizes the disposition of bus ramps and the Transbay terminal building for the bus terminal mitigation options. To allow for construction of a Main-Beale Bus Terminal (Option A) or surface lot (Options C), two existing bus ramps would be demolished: (1) the east-west bus ramp parallel to Folsom Street, and (2) the east bus loop. The west bus loop would be converted to two-way operation into and out of the existing Transbay Terminal during construction of the Main-Beale terminal or surface lot. Once completed, a new east/west bus ramp would be constructed for Options A or C1 to provide access to the Main-Beale bus terminal

Table 6.23-1
Disposition of Bus Ramps and Transbay Terminal Building

Structure	Option A		Option B		Option C		Option D	
	New Bus Terminal Building at Main-Beale Site		New Bus Terminal Building at Transbay Terminal Site		New Surface Bus Facility at Main-Beale Site		New Surface Bus Plaza at Transbay Terminal Site	
	Demolish	**Rebuild**	**Demolish**	**Rebuild**	**Demolish**	**Rebuild**	**Demolish**	**Rebuild**
Transbay Terminal Building	Year 3 [1]	No	Immediately	Yes	Year 3 [1]	No	Immediately	No
West Bus Loop (parallel to Essex Street leading to west entrance of Transbay Terminal)	Year 3 [1]	No	Immediately	Yes	Year 3 [1]	No	Immediately	No
East/West Bus Ramp (ramp parallel to Folsom St.)	Immediately	Yes	Year 5 [2]	No	Immediately	C1 = Yes C2 = No	Year 5 [2]	No
East Bus Access Loop (loop leading from east/west ramp to Transbay Terminal east entrance)	Immediately	No	Immediately	No	Immediately	No	Immediately	No

Notes:

[1] Under options A and C, the existing Transbay Terminal and west bus loop would be utilized until the new Main-Beale bus terminal building or surface facility was completed.

[2] Under Options B and D, the east/west bus ramp would be brought to the surface between Fremont and Beale Streets and used for access to the temporary bus facility at Main-Beale. It would be demolished upon completion of the new bus terminal or plaza at the Transbay Terminal site.

or plaza; and the west loop ramp and Transbay Terminal would then be demolished to allow for construction of the new CalTrain terminal.

During construction of a New Bus Terminal Building (Option B) or bus plaza (Option D) at the Transbay Terminal Site, the current east/west bus ramp extending parallel to Folsom Street would be demolished east of Fremont Street, and a new temporary bus ramp down to Beale Street would be constructed. This ramp would lead to a temporary surface bus facility between Main and Beale, just north of Folsom and south of Mission (up to the 201 Mission Street Building). This entire east/west bus ramp would be demolished upon completion of a New Bus Terminal Building or bus plaza at the Transbay Terminal Site.

Equipment typically involved in bus ramp demolition includes: crawler cranes, crawler dozer/ loaders, pavement breakers, rubber-tired loader/bob cats, trucks, excavator/backhoes, generator/ compressors, and water trucks for dust control.

6.23.4 Construction of New Bus Ramps

New bus ramps would not be built under bus mitigation Options C2 or D. For a New Bus Terminal Building at the Main-Beale Site (Option A), a new bus ramp would be built parallel to and north of the Fremont Street auto ramp and would cross Harrison, Folsom, Clementina, First, Fremont, and Beale Streets in an aerial configuration, extending into the southwest corner of a new three-story bus terminal. For the Main-Beale Surface Bus Facility (Option C1), a new bus ramp would be built parallel to and north of the Fremont Street auto ramp and would cross Harrison, Folsom, Clementina, First, and Fremont Streets in an aerial configuration and would ramp down to surface between Fremont and Beale Streets.

For the New Bus Terminal Building Options at the Transbay Terminal Site (Short & Medium), new bus ramps would be built west of Essex Street north to the west entrance of the new bus terminal. These ramps would be built following demolition of the current Transbay Terminal west bus ramps and in conjunction with the cut-and-cover portion of the CalTrain Extension.

New bus ramps would most likely consist of reinforced concrete structures supported on pile foundations. Foundation construction would involve the use of pile driving equipment, most likely hammers but possibly vibratory equipment in the softer ground away from Rincon Hill. Individual pile clusters would be topped with a reinforced concrete pile cap. Construction equipment would involve hydraulic backhoes and trucks for excavation, concrete truck mixers, and concrete pumps for the pile caps. The columns and superstructures would be constructed with crawler and rubber-tired cranes, concrete pumps, trucks, concrete truck mixers, and generators/ compressors.

6.23.5 Caltrans Automobile Ramp Construction

The California Department of Transportation (Caltrans) is currently designing, as part of its seismic retrofit program, a new replacement ramp for the I-80 automobile off-ramp to Fremont Street. The new ramp is also being designed to provide access to eastbound Folsom Street. Caltrans is also evaluating the need to seismically retrofit or replace the current bus ramps to the Transbay Terminal building, and the JPB has been working with Caltrans and the City/County of San Francisco on this review.

6.23.6 New Bus Terminal Construction

Construction of new bus terminal buildings (Transbay Terminal Short or Medium or Main-Beale Terminal Building) would be similar in nature to the construction of any large building in San Francisco. For a New Bus Terminal Building at the Main-Beale Site, if the optional underground garage were constructed, material would be excavated approximately 15 feet below the surface. Sides of the excavated area would be retained using a support system as the excavation occurs. With or without the optional underground garage, pile-drivers or augers would be used to place piles under the ground level prior to pouring the basement or ground floor slab, which would be constructed using steel reinforced concrete. This would be followed by construction of the supporting columns, side walls, floors, and roof for the three-level bus facility. For the New Bus Terminal Building at the Transbay Terminal Site, construction would occur on top of the underground CalTrain Station box structure already in place.

Equipment used for construction of the bus structure options would likely include: concrete pump truck, concrete trucks, trucks, crawler crane, crawler dozer/loader, rubber-tired loader/bob cats, compactor, roller, welder, generator/ compressor, excavator/backhoe, and augers. Pile drivers would be used for the New Bus Terminal Building at the Main-Beale Site option.

Equipment used for construction of the Main-Beale or Transbay Terminal sites surface options typically would include crawler dozer/loaders, surface graders, rubber-tired loaders/bob cats, trucks, concrete trucks, pavement breakers, excavator/backhoes, generator/compressors, compactors, rollers, concrete trucks, and paving machines.

6.23.7 Streets Affected by Construction of Mitigation Options

Streets affected by ramp demolition, ramp construction, and bus facility construction are identified in Table 6.23-2.

Table 6.23-2
Temporary Lane and Street Closures During Construction of Bus Facility Mitigation Options

- **Mitigation Options A, B, and C1:** Essex Street would be closed during a portion of the construction period for bus ramp construction to bus mitigation options A, B, and C1. Harrison and Folsom Streets would be subject to closure at night during ramp construction.
- **New Bus Terminal Building at Main-Beale Site (Option A):** First, Fremont, and Beale Streets would be subject to occasional closure at night and on weekends for construction of new bus ramps leading to a three-story bus facility at the Main-Beale site. Howard Street (between Main and Beale streets) would be subject of occasional closure during construction of this facility.
- **New Bus Terminal Building at Transbay Terminal Site (Option B) -- Short Terminal Configuration:** Clementina, Tehama, Howard, and Natoma Streets would be subject to occasional closure for construction of bus ramps. First Street would be subject to occasional closure at night and on weekends for construction of a new bus facility at the Transbay Terminal site. Howard Street between Main and Beale would be converted to four lanes westbound for the temporary surface bus terminal for three years. **Medium Terminal Configuration:** Clementina, Tehama, Howard, and Natoma Streets would be subject to occasional closure for construction of bus ramps. First and Fremont Street would be subject to occasional closure at night and on weekends for construction of a new bus facility at the Transbay Terminal site. Howard Street between Main and Beale would be converted to four lanes westbound for the temporary surface bus terminal for three years.
- **New Surface Bus Facility at Main-Beale Site (Option C1):** First and Fremont Streets would be subject to occasional closure at night and on weekends for construction of new bus ramps leading to a surface bus facility at the Main-Beale site. Howard Street would be converted to four lanes westbound between Main and Beale Streets. **(Option C2):** Howard Street would be converted to four lanes westbound between Main and Beale Streets.
- **New Surface Bus Facility at Transbay Terminal (Option D):** Howard Street between Main and Beale would be converted to four lanes westbound for the temporary surface bus terminal for three years.

6.23.8 Construction Phasing

Selection of a bus terminal mitigation option would affect the construction timing for the CalTrain extension and terminal train station. Should a new bus terminal or lot be built on the Main-Beale site (Options A or C), demolition of the Transbay Terminal would be delayed until the new bus facility were built and operating. This would delay construction of the CalTrain Terminal station by one to three years. Should the Transbay Terminal site be selected for a new bus terminal or plaza (Options B or D), the CalTrain terminal construction would be delayed until completion of a temporary surface bus facility at Main-Beale -- a delay estimated at between 8 and 12 months.

6.24 CONSTRUCTION IMPACTS ASSOCIATED WITH BUS TERMINAL REPLACEMENT OPTIONS

6.24.1 Impacts on Transit Operations

The transit services currently serving the Transbay Terminal would experience impacts of various levels from construction of new bus facilities, depending on the operator and bus terminal option. The following sections describe the construction impacts for each operator.

AC Transit

AC Transit would experience operating impacts during construction of a New Bus Terminal or plaza at the Transbay Terminal Site (Options B and D). These options would require the temporary relocation of AC Transit passenger operations to a surface lot (at the Main-Beale site) and the relocation of midday bus storage. AC Transit would operate at street level at the temporary surface facility for about five years, while bus storage would be located on the north side of Folsom Street between Fremont and Beale Streets. Moving midday bus storage to this site is expected to result in a slight increase in deadhead miles and hours. The temporary surface bus terminal would be served by an aerial ramp touching down at Beale Street between Folsom and Howard Streets (similar to Option C1), and the ramp assent/descent and street bus operations are expected to increase travel times for AC Transit by about one to two minutes for each bus leaving or entering the terminal. This represents an estimated additional 7,200 revenue-hours per year during the duration of the temporary relocation, and this travel time increase could negatively affect AC Transit patronage during construction. Under Options A and C, AC Transit would remain in the Transbay Terminal until a new Main-Beale terminal or plaza were constructed.

Construction could also cause delays in transit service due to construction vehicles and partial closure of streets, although any potential delays are estimated to be relatively minor and temporary.

Muni and SamTrans

During construction of any of the bus terminal replacement options, Muni and SamTrans would continue to operate on the crescent or "hump" area of the existing Transbay Terminal on Mission Street. Therefore, construction impacts to Muni and SamTrans are expected to be minimal and would include potential traffic delays due to partial street closures and construction truck traffic.

Other Operators

Golden Gate Transit would continue to operate their commuter routes as they are currently during construction of any of the mitigation options. The basic routes, which currently use the Transbay

Terminal, would operate on surface streets where potential delays from partial street closures and construction truck traffic could occur. Under Option B, Greyhound would relocate to a Main-Beale surface facility during the time the existing Transbay Terminal is demolished and the new bus facility is opened. The duration of the temporary relocation could be five to six years. Other bus operators such as Airporter buses would also have to relocate under Option B. Amtrak would most likely continue to operate out of the Ferry Building.

6.24.2 Impacts on Vehicular Traffic

Construction impacts on traffic described in Section 5.21.2 were for a "worst-case" scenario that includes the impacts of constructing a temporary surface bus facility (Options B or D) or a permanent surface bus facility (Options C) at the Main-Beale site. Construction impacts for a Transit Terminal Building at the Main-Beale Site (Option A) were not analyzed since traffic operations under that construction option would be less adverse than those under Options B, C or D. That is, a traffic analysis for construction of Options B, C or D would represent the worst case construction scenario.

Any construction traffic occurring between 7 and 9 AM or between 3:30 and 6 PM would coincide with peak commute hour traffic; however, none of the analyzed intersections would deteriorate from an acceptable level of service (LOS D or better) to an unacceptable level of service (LOS E or F) as a result of construction activity related to the CalTrain Extension or bus facility mitigation options.

It may be desirable, nonetheless, to restrict construction related traffic to hours outside peak commute periods to minimize conflicts with commute traffic. Modifications of the construction plans for the project may be needed to accommodate such restrictions.

6.24.3 Impacts on Parking

Parking impacts associated with construction of the bus facility mitigation options would occur during construction of a new east/west bus ramp leading to the Main-Beale Mitigation Options (A and C1) or during demolition of these ramps under Mitigation Option B and D. Construction activities would occur on portions of three parking lots between Folsom, Tehama, Second, and Beale Streets. These parking businesses are located on public land (Caltrans right-of-way either under existing roadway structures or along former operating rights-of-way) and have short-term renewable lease agreements with the State. Portions of the parking areas would need to be vacated during construction activities, but could be reestablished upon demolition of the old ramp or completion of the new ramp construction. Long-term acquisitions of parking facilities for the bus mitigation options are discussed in Section 6.8.

6.24.4 Impacts on Non-Motorized Traffic

Impacts to pedestrian traffic would occur as a result of the bus terminal replacement construction. Under Option A, sidewalks along Main, Beale and Howard Streets would be affected by construction. These sidewalks would also be affected under Option B, due to the use of the Main-Beale site as a temporary facility. Construction of Option B would be expected to affect sidewalks along First and Fremont Streets. Under Option C, Main, Beale and Howard Streets would be affected but for a shorter duration than with Option A. In the affected areas, pedestrian traffic would be restricted, detours would be provided and clearly marked, and covered walkways would be constructed where necessary.

6.24.5 Impacts on Neighborhoods and Businesses

Option A - New Bus Terminal Building at Main-Beale Site

For Option A, construction of a multi-story bus terminal building at the Main-Beale site would precede demolition of the Transbay Terminal and existing bus facilities. The east-west bus ramps leading to the facility from the Bay Bridge/I-80 would also be replaced to provide bus facility access and possibly bus storage. Construction activity would require temporary street closures (evenings, weekends, or possibly one or more weekdays) for ramp demolition and reconstruction, and this would affect traffic circulation and access to local businesses. Other impacts would include increased congestion from truck traffic; increased noise during construction periods; visual impacts; and possible increases in dust and particulates generated by construction activity.

Active businesses in the Main-Beale area include high-rise offices with street level retail or restaurants along Main Street, multi-story office and mixed-use commercial/manufacturing/distribution along Howard Street, and surface parking. Surface parking is the dominant land use along Clementina Street east of the West Loop ramps, under and along the south side (to Folsom Street) of the East-West bus ramps between First and Beale streets, and under the East Loop bus ramps along Beale Street (see Figure 5.21-1 for locations of surface parking lots potentially affected by the CalTrain Extension Project and bus mitigation options).

Option B - New Bus Terminal Building at Transbay Terminal Site

Construction of a new bus terminal building at the existing Transbay Terminal Site would occur following construction of the underground CalTrain Station. The major impact would be the extended level of construction activity at the site. The physical area potentially affected by the bus facility would not differ substantially from that affected by the CalTrain station construction. Effects on neighborhoods and businesses in the immediate area would be similar to those identified for the construction of the rail station: changes in traffic circulation; partial closure of streets, including Minna and Natoma Streets; increased noise during construction periods; visual impacts; and possible increases in dust and particulates generated by construction activity. Best Management Practices and other conditions in the Contractor's specifications would include measures to minimize these impacts.

During the demolition of the existing Transbay Terminal and construction of a new bus terminal on the site, bus operations currently at the terminal would be relocated to a temporary surface lot at Main-Beale streets, similar to the surface lot under bus terminal replacement Option C. The aerial east-west bus ramp between Folsom and Howard streets would be extended and brought to the surface at Beale Street. Construction of the surface lot and ramp extension as well as temporary bus operations at the lot would potentially affect adjacent businesses. The types of businesses in the area are noted above. Construction activity for the temporary bus facility would be completed in a relatively short period compared to that for the permanent facility at the Transbay Terminal site; however, surface lot bus operations would last through the construction period for the permanent bus terminal and generate noise, visual, and air quality impacts.

The aerial east-west bus ramp between Folsom and Howard streets (between Beale and the West Loop ramps to the Transbay Terminal site) would be removed upon completion of the permanent bus facility. Ramp demolition would potentially affect local businesses by changing circulation patterns and requiring temporary closures of streets passing under the ramps (evenings, weekends or possibly one or more weekdays) and generating noise, particulate and vibration impacts.

Option C - New Surface Bus Facility at Main-Beale Site

Construction activity and construction impacts would be similar to that for the temporary surface lot discussed above. More extensive improvements would be made for a permanent facility, including roof-and-wall structures to protect buses and passengers from the elements, a pedestrian overpass over Howard Street, and limited space for retail and services. These improvements would prolong construction activities and impacts in comparison with the temporary facility.

Option D - New Surface Bus Facility at Transbay Terminal Site

As with Option B, construction of a new bus plaza at the existing Transbay Terminal Site would occur following construction of the underground CalTrain Station. The major impact would be the extended level of construction activity at the site, although construction of a bus plaza would be less extended than construction of a building under Option B.

The physical area potentially affected by the surface bus facility would not differ substantially from that affected by the CalTrain station construction, and effects on neighborhoods and businesses in the immediate area would be similar to those identified for the construction of the rail station: changes in traffic circulation; partial closure of streets, including Minna and Natoma Streets; increased noise during construction periods; visual impacts; and possible increases in dust and particulates generated by construction activity. Best Management Practices and other conditions in the Contractor's specifications would include measures to minimize these impacts.

During the demolition of the existing Transbay Terminal and construction of a new bus terminal on the site, bus operations currently at the terminal would be relocated to a temporary surface lot at Main-Beale streets, similar to the surface lot under bus terminal replacement Option C. The aerial east-west bus ramp between Folsom and Howard streets would be extended and brought to the surface at Beale Street. Construction of the surface lot and ramp extension as well as temporary bus operations at the lot would potentially affect adjacent businesses. The types of businesses in the area are noted above. Construction activity for the temporary bus facility would be completed in a relatively short period; however, surface lot bus operations would last through the construction period for the permanent bus plaza and generate noise, visual, and air quality impacts.

The aerial east-west bus ramp between Folsom and Howard streets (between Beale and the West Loop ramps to the Transbay Terminal site) would be removed upon completion of the permanent bus plaza. Ramp demolition would potentially affect local businesses by changing circulation patterns and requiring temporary closures of streets passing under the ramps (evenings, weekends or possibly one or more weekdays) and generating noise, particulate and vibration impacts.

Mitigation

Best Management Practices and the other mitigation measures described in Section 5.21.5 for construction impacts on neighborhoods and businesses attributable to the CalTrain Extension Project would apply to construction of the bus facility replacement options.

6.24.6 Impacts on Community Facilities and Services

None of the community facilities identified in Section 4.3 would be affected by construction of the bus mitigation options, except to the extent that traffic delays caused by temporary detours and congestion may inconvenience people gaining access to these facilities.

Security services during construction would be provided by the San Francisco Police Department and other security personnel as identified in Sections 4.3 and 5.17.

The only increase in security services demand attributable to the project would occur during the construction phase of the project. During this time, the San Francisco Police Department anticipates that it would have to assign officers to monitor traffic congestion and detours along surface streets. However, it is likely that existing officers would be assigned to this task, and at this time no additional costs to the Department are anticipated. While emergency access would potentially be affected by any change in traffic conditions in the area, the traffic impacts of the project would be very minor and should not affect emergency access.

6.24.7 Impacts on Parklands, Schools, and Churches

None of the parks, schools, or churches identified in Section 4.4 would be affected by construction activities, except to the extent that traffic delays caused by temporary detours and congestion may inconvenience persons accessing the facilities.

6.24.8 Impacts on Air Quality

Potential construction-period increases in air pollutants are described in Section 5.21.8 by construction phase, along with mitigation measures proposed as part of the project. Construction phases described in Section 5.21.8 include construction of the bus facility replacement options.

None of the potential impacts or mitigations described in Section 5.21.8 would differ substantially with any of the replacement options, except insofar as each option would require slightly different amounts of time to construct, and as slightly different locations would be involved.

6.24.9 Impacts on Noise and Vibration

Construction noise and vibration would be more prevalent for bus terminal replacement Options A and B, given that they would involve construction of a major bus terminal building, while Options C and D would involve construction of a surface facility only. In addition, Option A at the Main-Beale site could involve the use of pile-driving equipment. Piles would not be needed for Options B, C or D. For Option B, piles would already be in place for the new underground CalTrain Terminal, and piles would not be necessary for the New Surface Bus Facility at the Main-Beale or Transbay Terminal sites (Options C and D).

All options are located in major commercial areas that experience typically high levels of noise from street traffic, and have, over recent years experienced noise and vibration from construction of new office buildings. Noise and vibration levels from the construction of Options A and B would be similar to that experienced during construction of these office buildings.

Construction noise can vary greatly depending on the construction process, type, and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise.

Table 5.21.9-1 summarizes relevant data on noise emissions of construction equipment from the FTA Guidance Manual.[7] Although noise levels in the table represent typical values, there can be wide fluctuations in noise emissions of similar equipment. In fact, several noise levels in the table exceed limits in the San Francisco noise regulation (as discussed in Section 5.21.9), and construction of bus facility mitigation options would be subject to requirements in this ordinance.

As the regulations are written, it is almost impossible to perform any significant construction during nighttime hours. The noise ordinance is enforced by the San Francisco Department of Public Works, which has some latitude in how the regulations are enforced and may waive some noise requirements to expedite the project or minimize traffic impacts. For example, surrounding land uses at both the Main-Beale and Transbay Terminal sites are almost exclusively commercial, and business owners in the area may prefer nighttime construction, given that it would reduce the disruption of normal business activities. The DPW waivers usually allow most construction processes to continue until 2 am, although construction processes that involve impacts to a surface are rarely allowed to extend beyond 10 pm.

It is not anticipated that the construction documents would have specific limits forbidding nighttime construction. Since the construction would be subject to the requirements of the San Francisco noise regulations, the contractor would need to work with the DPW to agree upon an acceptable approach balancing interruption of business, traffic disruptions, and reductions in the total duration of the construction.

Deliveries to the construction sites would be along pre-selected haul routes (see Figure 5.20-11). Most routes are along relatively busy streets with primarily commercial and industrial land uses, although there are some intermixed office space and residential land uses. Because daytime traffic on these routes is relatively heavy, it is not anticipated that the increase in daytime traffic from materials delivery would cause adverse impacts. However, nighttime hauling of building materials could be the source of minor noise impacts in the following areas: 4th Street, one block on Howard Street, and Brannan Street near 4th Street.

6.24.10 Impacts on Water Resources

Construction grading and utility excavations associated with construction of a Main-Beale bus facility mitigation option would have similar impacts to water resources as for the proposed project and are described in Section 5.21.10. No impacts to water resources are anticipated from construction of the bus facility on top of the underground train station.

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[7] *Transit Noise and Vibration Impact Assessment*, Office of Planning, Federal Transit Administration, US Department of Transportation, Report Number DOT-T-95-16 (April 1995).

6.24.11 Impacts on Utilities

Impacts to utilities are primarily considered to be long-term since their relocation would be long-term. These impacts are discussed in Sections 5.12 and 6.16. Necessary disruptions to service during construction would be short-term and carefully scheduled with advance notice to affected customers.

6.24.12 Impacts of Electromagnetic Fields

There would be no electromagnetic fields impacts associated with construction of the bus terminal replacement mitigation options.

6.24.13 Impacts on Historic and Cultural Resources

No impacts to historic structures identified within the project APE are anticipated from construction of any of the bus terminal replacement options beyond the loss of the existing Transbay Terminal and ramps, as discussed in Section 5.14. No additional construction impacts to archaeological resources are anticipated to those discussed in Section 6.18.

6.24.14 Hazardous Materials Impacts from Construction and Mitigation

Some hazardous materials, primarily fuels and motor oils, would be used during construction of any of the bus facility mitigation options. Construction of above-ground facilities would also use paints. While these are commonly used materials, they are considered hazardous (fuels, for example, are flammable), and improper handling could endanger workers and the public and could result in contamination of soil and/or water. Specifications provided to the construction contractor in project contract documents would be designed to prevent such releases of hazardous materials.

Other hazardous materials such as metals, fuel hydrocarbons, and coal tar may be present in soil and/or groundwater at the proposed bus terminal locations. The presence of hazardous constituents in soil and groundwater could affect the health and safety of construction workers and the general public and could also affect the cost to handle and dispose of spoils generated during construction excavation. The following sections summarize potential impacts of hazardous materials in soil and groundwater on each bus terminal mitigation options.

Option A: New Bus Terminal Building at Main-Beale Site

Construction of the Main-Beale bus terminal would require excavating potentially contaminated soils and dewatering groundwater that may include hazardous contaminants. This bus terminal option would be located within the Article 20 zone, suggesting that elevated levels of lead and other metals may be encountered in soil excavated during construction. In addition, PAHs in soil and coal tar from a former coal gas plant have been detected at several nearby sites (see Figure 4.17-1), including the San Francisco Gas Light Company (Sites 5 and 7), 301 Howard Street Association (Site 3), and 300 Howard Street (Site 4). The Federal Reserve Bank (Site 1), located approximately 200 feet from bus terminal Option A, had an unconfirmed release of waste oil that reportedly affected groundwater. Although the U.S. EPA site (Site 8) is identified as being involved with the production of pesticides and toxic substances, there was no indication of releases from this facility.

Option B: New Bus Terminal Building at Transbay Terminal Site

The potential presence of contaminated soil and groundwater is not expected to affect construction of a bus terminal on top of the proposed underground CalTrain station, although some construction activities may require disturbance of contaminated fill. Such activities include excavation of utility trenches and construction of roadways, ramps, parking areas, islands, and other accessory structures for the temporary and permanent bus terminals. Identified hazardous materials sites that could affect construction of this bus terminal option are the same as those that could affect the underground train station (see Section 5.21.14); however, none of the trenches and excavations necessary for utilities and accessory structures of the bus terminal are expected to encounter groundwater.

Option C: New Surface Bus Facility at Main-Beale Site

Construction of the Main-Beale surface bus facility would require relatively minor soil excavation for utility trenches and construction of roadways, parking areas, islands, and other accessory structures. No dewatering is anticipated for this alternative. Therefore, potential impacts related to hazardous materials are limited to areas where contaminated fill soils would be disturbed during construction. The types of hazardous constituents that may be encountered during construction are the same as those that would be encountered in construction of the Main-Beale bus terminal, including lead, PAHs, and fuel hydrocarbons.

Option D: New Surface Bus Facility at Transbay Terminal Site

Construction of a surface bus facility on top of the CalTrain Terminal Station would require relatively minor soil excavation for utility trenches and construction of roadways, parking areas, islands, and other accessory structures. No dewatering is anticipated for this alternative. Therefore, potential impacts related to hazardous materials are limited to areas where contaminated fill soils would be disturbed during construction. The types of hazardous constituents that may be encountered during construction are the same as those that would be encountered in construction of CalTrain terminal station (see Section 5.21.14); however, none of the trenches and excavations necessary for utilities and accessory structures of the bus terminal are expected to encounter groundwater.

Mitigation Measures

Mitigation measures for hazardous materials impacts related to construction of the bus facility mitigation options would be the same as those for impacts related to the CalTrain Extension construction and are discussed in Section 5.21.14.

6.24.15 Impacts on Visual and Aesthetic Setting

Project construction would be multi-phased and would occur in different locations at different times. Wherever and whenever construction occurs, associated equipment and supplies would be visible, and evidence of construction activity would be noticeable to area residents, employees, and visitors. Short term visual changes as a result of construction activities are a common and accepted feature of the urban environment, and generally mitigation is not warranted. The JPB would require the project contractor to ensure that construction crews working at night direct any artificial lighting onto the work site, in order to minimize "spill over" light or glare effects on adjacent areas.

6.24.16 Impacts on Safety and Security

Evaluation of long-term project impacts on public safety and security associated with the bus facility replacement options is presented in Section 6.21. Short-term safety and security impacts associated with construction activities related to the bus facility replacement options would be the same as those for construction activities related to the CalTrain Extension project. Evaluation of those impacts is presented in Section 5.21.17.

CHAPTER 7: MITIGATION FOR INCREASED CALTRAIN PARKING DEMAND

This chapter discusses mitigation proposed to address increased demand for parking at CalTrain rail stations that would result from building the CalTrain Downtown San Francisco Extension. Without mitigation, demand would exceed parking supply at many stations and result in parking spilling over into surrounding neighborhoods and/or potential CalTrain ridership being constrained by parking supply.

Various options are available for mitigating these potential impacts, including adding sufficient parking capacity at affected stations to fully accommodate unconstrained demand, encouraging shared-use of existing (underutilized) non-CalTrain parking facilities near stations, improving feeder bus services and other station access modes to reduce or offset parking requirements, and implementing traffic demand management strategies, among other options. Of these mitigation options, parking expansion is considered to have the greatest potential to result in additional environmental impacts at stations.

This chapter evaluates parking expansion as the proposed mitigation for increased parking demand under the CalTrain Extension Alternative and identifies the requirements for and potential effects of implementing capacity improvements at thirteen locations. The evaluation is intended to represent a conservative assessment of the impacts at stations of accommodating higher CalTrain ridership. Before implementing parking expansion as the preferred mitigation measure, the JPB intends to coordinate further with the individual cities and communities. Refinement or modification of parking expansion options may result, and other parking mitigation measures may be reconsidered or added to those described below.

Recently, the JPB has pursued efforts to compensate for CalTrain's existing and short-term parking needs. The right-of-way purchase from the Southern Pacific Transportation Company on December 27, 1991 included various option parcels along the rail corridor for the JPB's potential acquisition in the future, some of which may be suitable for meeting parking expansion needs. Several parcels were recently acquired by the JPB with funds advanced by the San Mateo County Transportation Authority. Their future use is not yet programmed. Unless specifically noted, the analysis of parking mitigation measures does not assume that parking expansion would be implemented on these or other potential properties in the absence of the CalTrain Extension Alternative and thereby become part of the No-Build, or baseline, supply. Instead, the analysis is based upon the more conservative assumption that mitigation would be required for the increase in parking demand over and above what can be accommodated by the existing supply, plus committed and programmed station improvements as of June 1996. These committed and programmed improvements are listed in Table 7.1-1.

Table 7.1-1 CalTrain Station Parking Supply and Demand in 2010 CalTrain Extension Alternative

Station	Existing Conditions		Future (2010) Conditions			Proposed Parking
	Supply	Demand [1]	No-Build Supply [2]	CalTrain Ext. Alt. Demand	Parking Deficit	Expansion
San Francisco	0	0	0	31	-31	0
22nd Street	0	15	0	20	-20	20
Paul Ave.	0	0	0	0	0	0
Bayshore	41	14	41	19	0	0
S. San Francisco	51	49	51	103	-52	100
San Bruno [3]	147	138	181	229	-48	50
Millbrae [4]	200	184	546	546	0	0
Broadway	190	111	190	103	0	130
Burlingame [5]	55	51	146	271	-125	175
San Mateo [6]	295	201	286	332	-62	0
Hayward Park [7]	0	0	200	185	0	0
Bay Meadows	0	0	0	0	0	0
Hillsdale	170	170	170	726	-556	556
Belmont [8]	703	146	403	458	-55	55
San Carlos [9]	295	272	285	426	-141	155
Sequoia/Redwood City	703	625	703	446	0	0
Atherton	286	237	286	52	0	0
Menlo Park	147	147	147	260	-113	150
Palo Alto [10]	347	272	322	422	-100	100
California Ave.	181	155	181	245	-64	45
Castro/San Antonio [11]	0	0	200	45	0	0
Mountain View [12]	295	244	420	300	0	0
Sunnyvale [13]	191	170	191	395	-204	225
Lawrence	191	113	181	122	0	0
Santa Clara	295	170	285	355	-60	75
San Jose/Diridon	645	328	645	735	-90	0
Tamien	400	49	400	158	0	0
Total Spaces:	5,118	3,802	6,414	7,044	-1,721	1,836

Notes

[1] The existing demand is in terms of long-term parking spaces and was derived from field surveys. Demand shown is constrained to available supply.

[2] Parking supply includes JPB lots and city lots dedicated exclusively to CalTrain users. 2010 supply assumes expansion due to currently committed and funded station relocations and grade separation projects that will include additional parking spaces. Handicapped, bicycle and motorcycle parking are excluded.

[3] Construction impacts from BART airport extension would permanently remove approximately 6 parking spaces.

[4] Millbrae 2010 deficit assumed to be covered by parking at proposed BART intermodal facility.

[5] Long-term lease of right-of-way from City and County of San Francisco along El Camino Real would make 91 additional spaces available to CalTrain users in the future.

[6] Construction of new transit center assumed to add 65 spaces to 2010 supply.

[7] Relocated Hayward Park Station assumed to provide up to 200 spaces to 2010 supply.

[8] Grade separation and related improvements assumed to add up to 200 spaces to 2010 supply.

[9] Grade separation and related improvements assumed to add 50 spaces to 2010 supply.

[10] Expansion of bus transit center and other roadway improvements would remove approximately 25 spaces from existing supply.

[11] New San Antonio Station assumed to add up to 200 spaces to 2010 supply.

[12] Development of Downtown Transit Center would provide 420 parking spaces in Phase I (year 2000).

[13] Construction of a new lot would add 110 spaces; shared use of adjacent private lots would provide for balance of 2010 demand.

Sources: Parking demand from Korve Engineering, Inc., Ridership Forecasting Results Report, May 1996. Parking supply based upon 1993 inventory prepared by JPB and updated in 1995 by JPB and De Leuw, Cather & Co.
Future parking expansion by De Leuw, Cather & Company

The discussion of mitigation for increased CalTrain parking demand first summarizes the future need for CalTrain parking and the stations where expansion is proposed. With the exception of the 22nd Street Station, which is located in the City and County of San Francisco, all of the potentially affected stations are in San Mateo and Santa Clara Counties. The discussion subsequently identifies the potential impacts of parking expansion at each of these stations.

7.1 NEED FOR PARKING LOT EXPANSION

The CalTrain Extension Alternative is projected to increase ridership on the system by approximately 8,100 to 11,100 boardings each weekday in 2010 (see Chapter 3, Section 3.1). A large proportion of these new riders are anticipated to gain access to CalTrain by auto--either driving to stations and parking (park and ride) or being dropped off (kiss and ride). Currently, about 41 percent of CalTrain riders drive to and park at the station and another 13 percent are dropped off at the station.[1] Auto is anticipated to continue as the primary access mode in the future.

An increase in auto access to stations translates to an increase in parking demand. Table 7.1-1 summarizes the projected 2010 parking demand at the 28 CalTrain stations between San Francisco and San Jose, the primary travel market and stations influenced by the CalTrain Extension Alternative. Approximately 7,044 spaces would be needed to accommodate future demand with the proposed project, an 85 percent increase over the 1995 parking demand. Future demand is anticipated to exceed future parking supply at 16 CalTrain stations. Projected year 2010 parking supply at these corridor stations is also shown in Table 7.1-1. Future supply estimates include parking expansions programmed by the JPB in coming years as part of its proposed improvements to existing stations and station access (e.g., grade separations), proposed new or relocated stations, and other improvement projects designed to address short-term parking requirements. These expansions are independent of the proposed CalTrain Extension Alternative and could add on the order of 1,300 spaces to the existing 1995 supply.

This added parking would not be sufficient to accommodate the parking demand attributable to the CalTrain Extension Alternative. At individual rail stations, the parking shortfall is projected to range from 20 to over 550 spaces. Without parking expansion, excess demand may result in parking on local streets or in adjacent municipal lots. Where parking cannot be accommodated, CalTrain ridership may suffer and remain below its potential, with a resulting increase in auto commuting.

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[1] CalTrain On-Board Passenger Summary, Executive Summary, PCJPB, February 1994. This mode split figure is based upon mode of access to northbound trains on weekdays. Walking is the second most common mode of access to CalTrain, with a 26 percent mode share.

To address the increased parking requirements associated with the CalTrain Extension Alternative, mitigation is proposed that would expand parking opportunities by approximately 1,826 spaces at 12 of the 15 stations projected to have parking deficits in 2010 and at one additional station (Broadway) that could accommodate a portion of the deficit at the Burlingame and San Mateo stations. The 15 stations with projected year 2010 deficits under the CalTrain Extension Alternative, from north to south along the corridor, include:

- San Francisco (deficit of 31 spaces)
- 22nd Street Station in San Francisco (20 spaces)
- South San Francisco Station (52 spaces)
- San Bruno Station (48 spaces)
- Burlingame Station (125 spaces)
- San Mateo Station (62 spaces)
- Hillsdale Station in San Mateo (556 spaces)
- Belmont Station (55) spaces)
- San Carlos Station (141 spaces)
- Menlo Park Station (113 spaces)
- Palo Alto Station (100 spaces)
- California Avenue Station in Palo Alto (64 spaces)
- Sunnyvale Station (204 spaces)
- Santa Clara Station (60 spaces).
- San Jose/Diridon Station (90 spaces).

Three of these stations with parking deficits projected by 2010 are not proposed for parking expansion as part of the mitigation for the CalTrain Extension Alternative: San Francisco Station, San Mateo Station, and San Jose/Diridon Station. The San Francisco Station would be located in an urban setting where CalTrain parking demand could be accommodated through existing private and shared-use lots. The excess San Mateo Station parking demand could be accommodated at adjacent stations. The San Jose/Diridon Station parking demand could be reasonably accommodated by local lots in the area (that also serve the San Jose Arena and the downtown) or at the adjacent Tamien Station, which is projected to have a surplus of over 200 spaces.

Parking expansion is proposed at the Broadway Station in the City of Burlingame, although it does not have a 2010 parking deficit, because of its central location in San Mateo County and the need to provide alternate parking for potential overflow situations at nearby stations

The estimated cost for parking mitigation is $35.5 million in 1995 dollars. The improvements would be implemented in conjunction with the CalTrain Extension Alternative.

7.2 METHODOLOGY

7.2.1 Projecting Demand for Parking under CalTrain Extension Alternative

Estimated 2010 station parking demand associated with the CalTrain Extension Alternative was provided by SamTrans, who assumed an 86-trains-per-weekday service in the corridor. Ridership forecasts were prepared using the San Mateo Countywide Model and its associated transit and highway networks. Parking deficits were estimated by comparing parking supply with projected 2010 demand. Supply was determined through station parking inventories prepared in 1993 and early 1995 by the JPB and updated by limited field surveys made by De Leuw, Cather and Company in late 1995 and early 1996. Adjustments to existing parking totals were made to account for committed station and related improvements.

7.2.2 Identifying and Qualifying Areas for Expanded Parking

Property surveys were performed at stations at which parking mitigation is proposed to develop a long list of expansion opportunities. Field visits and property record searches were conducted to develop property descriptions. Coordination meetings were held with JPB staff and the City and County of San Francisco, who owns property along the CalTrain corridor north of Burlingame. Telephone contacts were also made with local city and agency staff.

Parking expansion alternatives were evaluated in terms of walk distance, potential environmental constraints, ability to meet demand, and possible cost. A field reconnaissance was conducted of the potential expansion sites to identify environmental issues that could make development infeasible. Particular attention was paid to natural resources (i.e., wetlands, riparian vegetation, sensitive habitat) and cultural resources (i.e., prehistoric or historic archaeological sites, historic structures). In this manner, potential expansion areas, or portions of expansion areas, with major environmental constraints were eliminated from further consideration.

A screened short list of parcels was then developed and recommended for further evaluation. Because of the selection process identified above, most environmental issues associated with parking expansion development were eliminated. A more detailed evaluation of traffic impacts on potentially affected intersections was conducted. The effect of increased auto trip traffic to and from the stations on the operation of key intersections was analyzed by comparing intersection level of service under the No-Build Alternative and with CalTrain Extension Alternative parking mitigation in place using procedures based upon the 1994 Highway Capacity Manual, Chapter 9, Signalized Intersections. Impacts were evaluated in terms of local jurisdictional thresholds. The results of this analysis are summarized in the following section.

In addition, the potential tax revenue loss from conversion of private land to public ownership for parking expansion was calculated for those private parcels that would be acquired. The results of this analysis are also presented.

7.2.3 Parking Expansion Construction Methods

With the exception of two locations in the City of San Mateo, parking lot expansion would be implemented by constructing new surface lots adjacent to or in the vicinity of existing CalTrain surface parking areas. In order to obtain the needed spaces at the Hillsdale Station in San Mateo, the mitigation would include construction of a multi-level parking garage in addition to a new surface parking lot. Mitigation at the Sunnyvale Station would involve expanding parking in a new surface lot and through shared-use parking at nearby lots.

Surface lot construction would involve clearing, grading and paving new areas to be designated for parking and for access. Drainage improvements, lighting, signing, and landscaping would also be provided. Depending upon location, existing structures may require relocation or demolition. In most cases, the areas proposed for added parking are vacant or underutilized parcels with no major structures or natural features. The few exceptions where changes in the natural environment or displacement of existing structures are proposed are identified in the following discussions.

The duration of construction activity at any location would depend upon the specific improvements to be made, but normally would last from two to six months for surface lot improvements and from 12 to 18 months for parking structures. Heavy equipment such as graders, bulldozers, asphalt paving equipment, and heavy trucks would be used during construction. No street closures for extended periods (over four hours) are anticipated, other than temporary disruptions to relocate equipment or construct curbside improvements for lot access.

7.3 IMPACTS OF AND MITIGATION FOR PARKING EXPANSIONS BY STATION

Because of the parking expansion site selection process described above, most impacts of parking expansion would be avoided. The primary exceptions are associated with traffic and fiscal impacts. Table 7.3-1 provides a summary of impacts and proposed mitigation measures at the 13 stations where parking expansion is proposed. Table 7.3-2 provides a summary of local government tax revenues potentially lost due to proposed acquisitions of private property. Tables 7.3-3 and 7.3-4 summarize intersection operations for the year 2010 with and without traffic attributable to the parking expansions. The tables are followed by brief narrative descriptions for each affected station area.

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
22nd Street	No exceedence of state or federal air quality standards.	Site is disturbed with no evidence of cultural resources present.	No displacement of residences or businesses would result.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with adjacent land uses. No adverse effects to local businesses.	Site is generally paved with no sensitive habitat present.	Peak hour traffic generated by station parking would be light and easily accommodated by the street network (see Tables 7.3-3 and 7.3-4).
South San Francisco	No exceedence of state or federal air quality standards.	Site is disturbed with no evidence of cultural resources present.	No displacement of residences or businesses would result.	Loss in property taxes to San Mateo County and City of South San Francisco of approximately $1,930 annually (see Table 7.3-2).	No evidence of any hazardous materials present.	Parking would be compatible with adjacent land uses. No adverse effects to local businesses.	Site is generally paved with no sensitive habitat present.	Parking generated traffic at Dubuque/East Grand intersection would not appreciably affect intersection performance (see Tables 7.3-3 and 7.3-4).
San Bruno	No exceedence of state or federal air quality standards.	Site is disturbed with no evidence of cultural resources present.	No displacement of residences or businesses would result.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with adjacent land uses. No adverse effects to local businesses.	Some ruderal grassland of wild oats and soft chess would be lost. Potential seasonal wetlands to the south and east would not be disturbed.	Peak hour traffic generated by station parking would be light and would not substantially affect local intersections (see Tables 7.3-3 and 7.3-4).

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
Broadway (Burlingame)	No exceedence of state or federal air quality standards.	No cultural resources are apparent from surface inspections.	One business with two structures would be displaced.	Combined loss of $880 annually in property tax revenues and $6,000 annually in sales tax revenues (see Table 7.3-2).	Undergound fuel tanks would have to be removed. Mitigation of potential hazardous materials impacts would be required and would consist of soil and groundwater investigations, chemical testing, and possibly removing or remediating contaminated soils and/or groundwater.	Parking would be compatible with adjacent land uses. One business would be displaced that would not be expected to adversely affect the local economy.	Several small trees would be removed. They are not considered part of a sensitive habitat.	Incremental traffic due to parking expansion would contribute to a worsening in average vehicle delay at the California Drive/Broadway intersection but the impact is considered small and not warranting mitigation (see Tables 7.3-3 and 7.3-4).

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
Burlingame	No exceedence of state or federal air quality standards.	Expansion areas are paved no cultural resources are evident.	Leased auto storage would be displaced.	Annual property tax losses of approximately $1,180 (see Table 7.3-2)	No evidence of any hazardous materials present.	Parking would be compatible with adjacent land uses. Landscaped buffer would be provided along south Myrtle Street. Private parking and vehicle storage along East and West lanes (on property leased from JPB) would be reduced with a potentially adverse short-term effect on auto services businesses.	Expansion areas are mostly paved with a portion covered by ruderal/annual grasses that are not considered important habitat.	Incremental effect of expanded parking-related traffic at the California Drive/ Burlingame Avenue intersection would be minor (see Tables 7.3-3 and 7.3-4). Signing is recommended to enhance traffic circulation.
San Mateo	No parking mitigation improvements are proposed at this station beyond what the City of San Mateo is already planning to construct.							

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
Hillsdale (San Mateo)	No exceedence of state or federal air quality standards.	Both proposed expansion areas are paved with no cultural resources evident.	One vacant structure would be displaced south of the Hillsdale Station. The existing station ticket office would be removed from the north lot. Up to 80 private parking spaces for restaurant would be displaced. Shared use of CalTrain parking structure during evenings and on weekends by restaurant users would be allowed.	Loss of local property tax revenues of approximately $370 annually (see Table 7.3-2).	No evidence of any hazardous materials present.	Parking would be compatible with the adjacent land uses.	Both expansion areas are paved with no important natural resources present.	Incremental effect of expanded parking-related traffic would be minor (see Tables 7.3-3 and 7.3-4). Improved channelization of right-turn traffic at the El Camino Real NB Ramps/ E. Hillsdale intersection would be implemented. Right-turn lane restriping on the northbound El Camino Real off-ramp is recommended.

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
Belmont	No exceedence of state or federal air quality standards.	Proposed expansion areas are disturbed with no evidence of cultural resources present.	No structures or businesses would be displaced.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses and no disruption to businesses would occur.	Expansion areas are almost devoid of vegetation with no sensitive natural resources present.	Incremental increase from expanded parking-related traffic would have slight effect on increasing average vehicle delay (see Tables 7.3-3and 7.3-4). Signing improvements to redirect parking-related traffic away from affected intersection would be implemented.
San Carlos	No exceedence of state or federal air quality standards.	Both expansion parcels are cleared of vegetation and no evidence of cultural resources is present.	No structures or businesses would be displaced.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses and no disruption to businesses would occur.	Expansion areas are almost devoid of vegetation with no sensitive natural resources present.	Increased traffic from the parking expansion would moderately increase congestion at the El Camino Real/San Carlos Avenue intersection (see Tables 7.3-3 and 7.3-4).

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
Menlo Park	No exceedence of state or federal air quality standards.	No cultural resources are evident on or near the proposed expansion site.	Displacement of private vehicle storage for a motor vehicle sales and service establishment would occur.	Loss of local property tax revenues of approximately $15,740 annually would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses.	Loss of five mature California live oak trees along or near existing CalTrain frontage would occur.	Expanded parking-related traffic would slightly add to traffic congestion at 3 nearby intersections (see Tables 7.3-3 and 7.3-4). Since this incremental increase is very slight no mitigation is warranted.
Palo Alto	No exceedence of state or federal air quality standards.	No cultural resources are evident on or near the proposed expansion sites.	No structures or businesses would be displaced. Auto storage on south parking expansion area would be removed. Storage is month-to-month lease on public property.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses.	No sensitive biological resources are evident on the expansion sites.	Expanded parking-related traffic would slightly add to average vehicle delay at 2 nearby intersections (see Tables 7.3-3 and 7.3-4). No mitigation is warranted.

Table 7-3-1: Summary of Impacts and Proposed Mitigation for Parking Expansions, by Station

Station	Impact Category							
	Air Quality	Cultural Resources	Displacement and Relocation	Fiscal and Economic	Hazardous Materials	Land Use and Socioeconomics	Natural Resources	Traffic
California Avenue (Palo Alto)	No exceedence of state or federal air quality standards.	No cultural resources are evident on or near the proposed expansion site.	No structures or businesses would be displaced.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses.	No sensitive biological resources are evident on the expansion site.	Expanded parking-related traffic would be too slight to effect the LOS at the one nearby intersection (see Tables 7.3-3 and 7.3-4). No mitigation is warranted.
Sunnyvale	No exceedence of state or federal air quality standards.	No cultural resources are evident on or near the proposed expansion site.	No structures or businesses would be displaced. Most of proposed expansion area is currently paved for parking.	Loss in property taxes to City of Sunnyvale and Santa Clara County of approximately $1,200 annually (see Table 7.3-2).	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses.	No sensitive biological resources are evident on the expansion sites.	Expanded CalTrain parking-related traffic would not adversely affect LOS at nearby intersections (see Tables 7.3-3 and 7.3-4).
Santa Clara	No exceedence of state or federal air quality standards	An historic railroad tower and two railroad sheds are between expansion area and existing CalTrain lot, but would not be affected. No effect to NRHP-listed station structure.	No structures or businesses would be displaced.	No loss of tax revenue would occur.	No evidence of any hazardous materials present.	Parking would be compatible with surrounding land uses.	No sensitive biological resources are evident on the expansion site.	Expanded parking-related traffic would not affect the LOS at the one nearby intersection (see Tables 7.3-3 and 7.3-4).

Table 7.3-2
Summary of Local Tax Revenue Impacts of Property Acquisitions for Parking Expansion Improvements

Station	Location of Parcel Proposed to be Acquired	Parcel Size (Sq. Ft.)	Use	Annual Revenue Loss	
				Property Tax	Local Sales Tax
South San Francisco	North & Southwest of Existing Lot	67,430	Vacant	$1,930	—
Broadway	North of Existing Lot, West of CalTrain	9,000	Vacant	$260	—
	North & South of Broadway, East of CalTrain	21,500	Gas Station, Car Wash	$620	$6,000*
Burlingame	South of Howard Ave., East of CalTrain	41,100	Vacant	$1,180	—
Hillsdale	North of Existing North Parking Lot	3,000	Parking	$370	—
Menlo Park	North of Oak Grove Ave. & Existing Lot	67,600	Vehicle Storage	$15,740	—
Sunnyvale	South of Station and Existing Parking Lot	44,400	Parking	$1,200	—
	Total	254,030		$21,300	$6,000

* Loss to city only; county sales taxes assumed to be replaced by activity elsewhere in San Mateo County

Source: De Leuw, Cather & Co.

Table 7.3-3
Intersection Level of Service Summary: AM Peak Hour

Nearby Station	Intersection	1996			2010					
		Existing Condition			No-Build			CalTrain Extension Alternative		
		Delay (sec.)	LOS	V/C Ratio	Delay (sec.)	LOS	V/C Ratio	Delay (sec.)	LOS	V/C Ratio
South San Francisco	E. Grand Ave. & Dubuque Ave.	18.7	B	0.37	12.8	B	0.44	18.7	B	0.44
Broadway	California Dr. & Broadway Ave.	24.2	B	0.44	24.1	B	0.68	24.5	C	0.68
Burlingame	California Dr. & Burlingame Ave.	12.8	C+	0.37	18.7	B	0.37	10.1	B	0.68
	California Dr. & Oak Grove Ave.	18.7	B	0.53	18.7	B	0.53	24.5	B	0.68
Hillsdale	El Camino Real E. Ramp & Hillsdale Blvd.	19.5	C+	0.70	19.3	C+	0.68	19.8	C+	0.68
	El Camino Real W. Ramp & Hillsdale Blvd.	24.1	C	0.56	22.1	B	0.78	24.7	C	0.77
	El Camino Real E. Ramp & 31st Street	8.8	B+	0.37	8.8	B+	0.30	19.8	B	0.38
San Mateo	Main Street & First Street*	4.9	A		4.7	A		8.8	A	
Belmont	El Camino Real & Ralston Ave.	24.5	B	0.67	24.1	C	0.68	12.8	C	0.75
	Old County Rd. & Ralston Ave.	26.0	D+	0.65	55.6	B	1.02	55.6	C	1.02
San Carlos	El Camino Real & San Carlos Ave.	18.7	C+	0.53	24.7	C	0.78	26.0	D+	0.75
Menlo Park	El Camino Real & Oak Grove Ave.	35.8	D	0.37	67.1	F	0.75	67.1	F	0.95
	El Camino Real & Santa Cruz Ave.	8.8	B+	0.44	18.7	B	0.68	11.5	B	0.38
	El Camino Real & Ravenswood Ave.	30.4	D	0.62	30.4	C+	0.78	19.8	C+	0.38
Palo Alto	Alma Street & Hamilton Ave.	8.8	B+	0.53	18.7	B	0.75	19.8	B	0.77
	Alma Street & Lytton Ave.	8.8	B+	0.65	8.8	B+	0.68	8.8	B+	0.68
	El Camino Real & California Ave.	18.7	C+	0.62	18.7	C+	0.75	24.7	C	0.75
Mountain View	Castro Street & Villa Street	19.8	C+	0.44	30.4	D+	0.78	34.1	D	0.38
Sunnyvale View	Castro Street & Villa Street	13.1	B	0.43	18.7	B	0.37	19.8	B	0.38
	Evelyn Ave. , and Sunnyvale Ave.	7.8	B+	0.25	18.7	B	0.30	11.3	B	0.38
Santa Clara	El Camino Real/82 and Benton Street	6.3	B+	0.48	12.9	B	0.60	13.0	B	0.60

* An unsignalized intersection

Delay = average delay in seconds for each vehicle passing through the intersection
LOS = Level of service
V/C Ratio = Ratio of demand traffic volume to the physical capacity of intersection

Source: De Leuw, Cather & Co.
Korve Engineering Inc. (No Build Traffic Volumes)

Table 7.3-4
Intersection Level of Service Summary: PM Peak Hour

Nearby Station	Intersection	1996			2010					
		Existing Condition			No-Build			Caltrain Extension Alternative		
		Delay (sec.)	LOS	V/C Ratio	Delay (sec.)	LOS	V/C Ratio	Delay (sec.)	LOS	V/C Ratio
South San Francisco	E. Grand Ave. & Dubuque Ave.	10.3	B	0.42	9.3	B+	0.31	9.5	B+	0.31
Broadway	California Dr. & Broadway Ave.	35.9	D	0.71	61.1	F	1.05	62.0	F	1.05
Burlingame	California Dr. & Burlingame Ave.	27.8	D+	0.83	53.3	E	1.30	58.9	E	1.31
	California Dr. & Oak Grove Ave.	13.7	B	0.59	18.5	C+	0.63	19.8	C+	0.64
Hillsdale	El Camino Real E. Ramp & Hillsdale Blvd.	19.5	C+	0.70	27.9	D+	0.87	29.2	D+	0.89
	El Camino Real W. Ramp & Hillsdale Blvd.	29.4	D+	0.71	25.5	D+	0.75	27.0	D	0.77
	El Camino Real & 31st Street	29.4	E	0.52	17.6	C+	0.60	20.0	E	0.68
San Mateo	Main Street & First Street *	4.8	A		5.6	B		5.7	B	
Belmont	El Camino Real & Ralston Ave.	105.5	F	1.46	105.5	E	1.08	104.9	F	1.08
	Old County Rd. & Ralston Ave.	26.7	D+	0.62	48.7	C+	0.85	50.8	E	0.86
San Carlos	El Camino Real & San Carlos Ave.	16.4	C+	0.64	25.3	D+	0.92	26.0	D+	0.98
Menlo Park	El Camino Real & Oak Grove Ave.	24.7	E	0.66	43.5	C+	1.06	43.5	E+	1.06
	El Camino Real & Santa Cruz Ave.	18.2	C+	0.62	36.3	D	0.97	37.5	D	0.99
	El Camino Real & Ravenswood Ave.	29.5	D+	0.80	39.3	D	0.98	39.5	D	0.98
Palo Alto	Alma Street & Hamilton Ave.	24.2	E	0.87	54.5	E	0.95	56.8	E	0.96
	Alma Street & Lytton Ave.	11.1	B	0.61	28.0	D+	0.91	31.2	D+	0.82
	El Camino Real & California Ave.	19.1	C+	0.69	51.2	E	1.72	51.1	E	1.71
Mountain View	Castro Street & Villa Street	68.5	E	0.91	94.4	E	1.42	94.4	E	1.42
Sunnyvale	Evelyn Ave. and Frances Street	9.0	B+	0.28	8.8	B+	0.43	5.6	B+	0.28
	Evelyn Ave. and Sunnyvale Ave.	20.2	E	0.43	28.3	D+	0.64	28.3	D+	0.65
Santa Clara	El Camino Real/82 and Benton Street	19.3	C+	0.59	16.3	C+	0.65	17.0	C+	0.66

* An unsignalized intersection

Delay = average delay in seconds for each vehicle passing through the intersection
LOS = Level of service
V/C Ratio = Ratio of demand traffic volume to the physical capacity of intersection.

Source: De Leuw, Cather & Co.
Korve Engineering Inc. (No Build Traffic Volumes)

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7.3.1 22nd Street Station

The existing station is located under the I-280 freeway southbound lanes immediately south of 22nd Street. There is currently no dedicated CalTrain parking at this station. The CalTrain Extension Alternative would provide parking for future CalTrain users at the station. Future parking demand for approximately 20 spaces would be accommodated under the aerial northbound freeway structure on either side of 22nd Street. Figure 7.3-1 shows the general station area and the location of the existing station platform and proposed parking areas.

Lot areas would require asphalt paving and installation of lighting. The total pavement area would be on the order of 1,500-2,000 sq. ft. No major disruption of traffic or local businesses would be anticipated. No major impacts would result from construction or long-term operation of the proposed additional surface parking at the 22nd Street Station. No further mitigation of impacts is proposed.

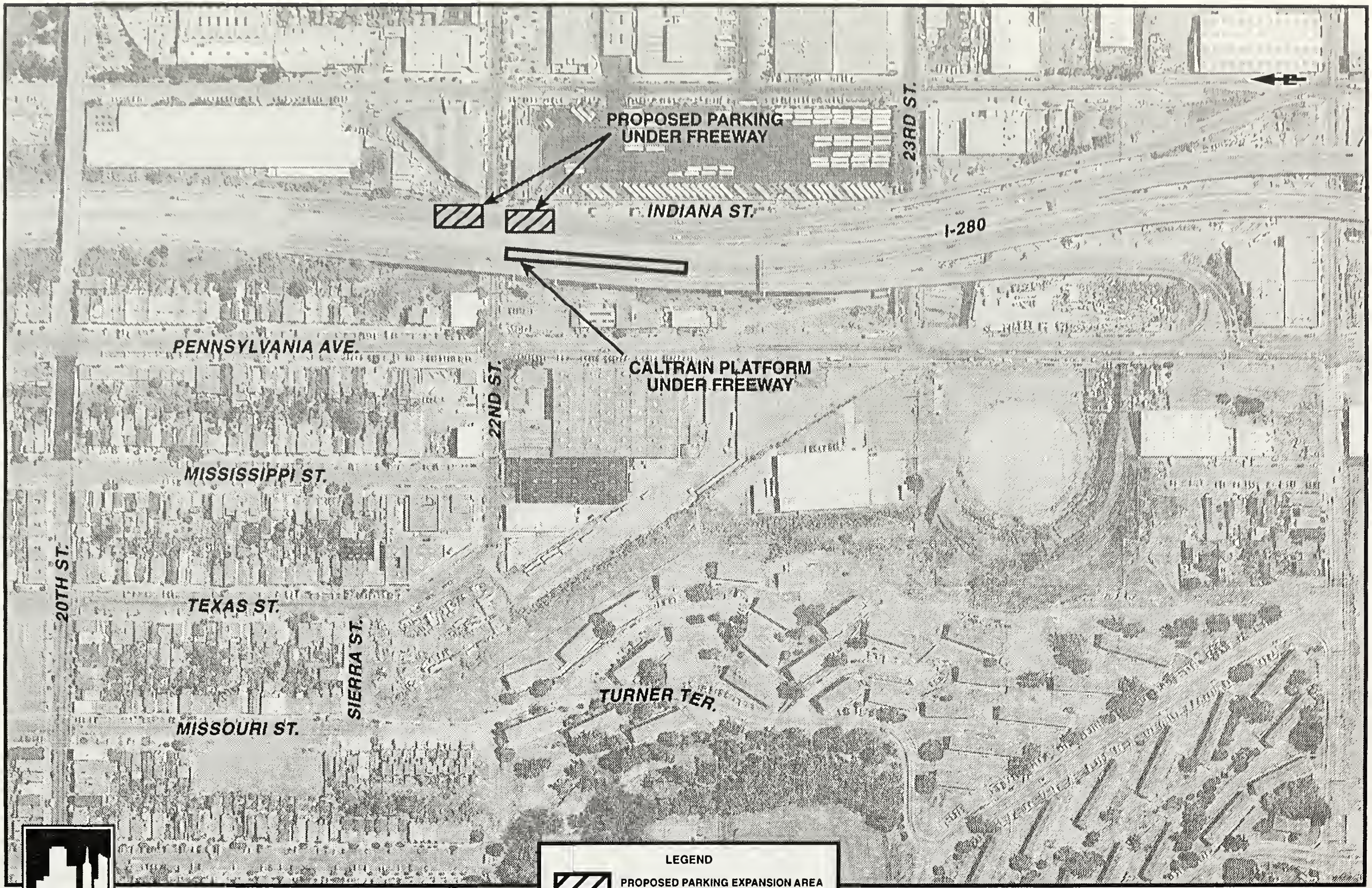
7.3.2 South San Francisco Station

The existing station platform extends under the East Grand Avenue overcrossing, with station access provided via Dubuque Avenue. Parking expansion is proposed along the west side of the CalTrain right-of-way, both north and south of the existing parking lot. At least 100 additional spaces would be provided. Figure 7.3-2 shows the location of parking expansion areas relative to the existing station platform and parking lot.

Moderate grading, asphalt paving, drainage improvements and lighting would be required to expand parking at this location. This activity would be confined to the site and would not affect adjacent land uses or traffic conditions on Dubuque Avenue. Impacts from parking expansion are considered minor, and no additional mitigation is needed.

7.3.3 San Bruno Station

This station would be moved temporarily to under I-380 during the construction of the BART extension to San Francisco International Airport. The BART project proposes to ultimately return the station to its current location, although the City of San Bruno's General Plan identifies a permanent station site at I-380. This parking mitigation analysis is based upon the restoration of the San Bruno Station at its current site. Should the city implement its general plan objective, a separate assessment of environmental impacts would be required.


PROPOSED PARKING UNDER FREEWAY
23RD ST.
INDIANA ST.
I-280
CALTRAIN PLATFORM UNDER FREEWAY
PENNSYLVANIA AVE.
22ND ST.
MISSISSIPPI ST.
20TH ST.
TEXAS ST.
SIERRA ST.
TURNER TER.
MISSOURI ST.

LEGEND

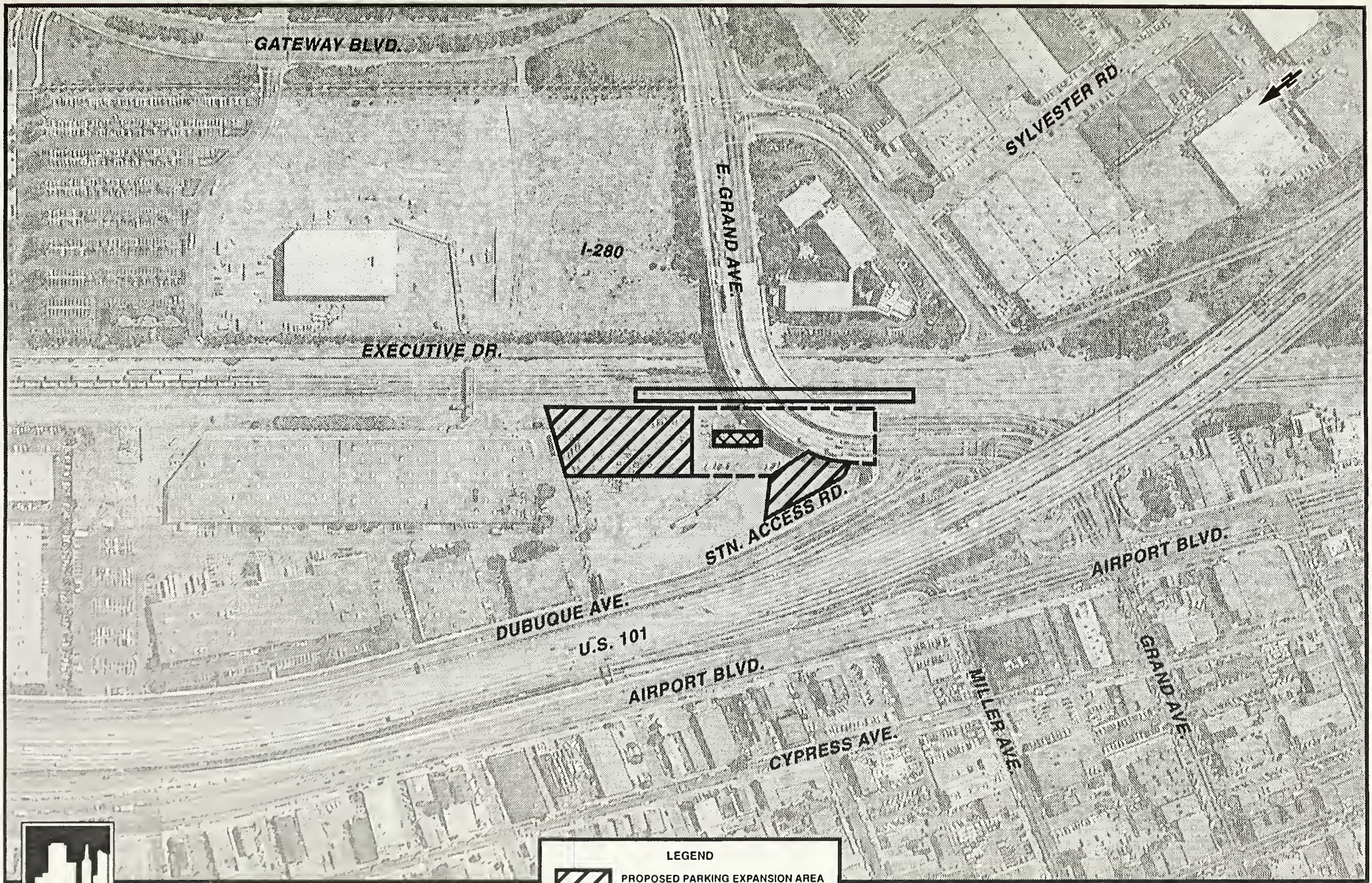
- ▨ PROPOSED PARKING EXPANSION AREA
- ⬚ EXISTING CALTRAIN PARKING LOT
- ▭ STATION PLATFORM
- ⊠ STATION STRUCTURE

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

22ND STREET STATION

FIGURE 7.3-1


GATEWAY BLVD.
SYLVESTER RD.
N
I-280
E. GRAND AVE.
EXECUTIVE DR.
STN. ACCESS RD.
AIRPORT BLVD.
DUBUQUE AVE.
U.S. 101
AIRPORT BLVD.
MILLER AVE.
GRAND AVE.
CYPRESS AVE.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
⬚ EXISTING CALTRAIN PARKING LOT
▭ STATION PLATFORM
▩ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SOUTH SAN FRANCISCO STATION

FIGURE 7.3-2

The mitigation proposed for increased parking demand at San Bruno Station is to provide additional parking space for up to 50 vehicles in an approximately 0.4-acre parcel immediately south of the existing station parking lot on the west side of the CalTrain tracks. The land is within the CalTrain right-of-way and owned by the Joint Powers Board. The location of the expansion lot is shown in Figure 7.3-3.

Moderate grading, asphalt paving, and possibly drainage and lighting improvements would be required to expand parking at this location. This activity would be confined to the site, with construction staging taking place on the existing CalTrain lot to the north. Construction would not have a major effect on adjacent land uses or traffic operations along Huntington Avenue.

No major impacts would result from the construction or long-term operation of the expanded parking, and no additional mitigation is warranted.

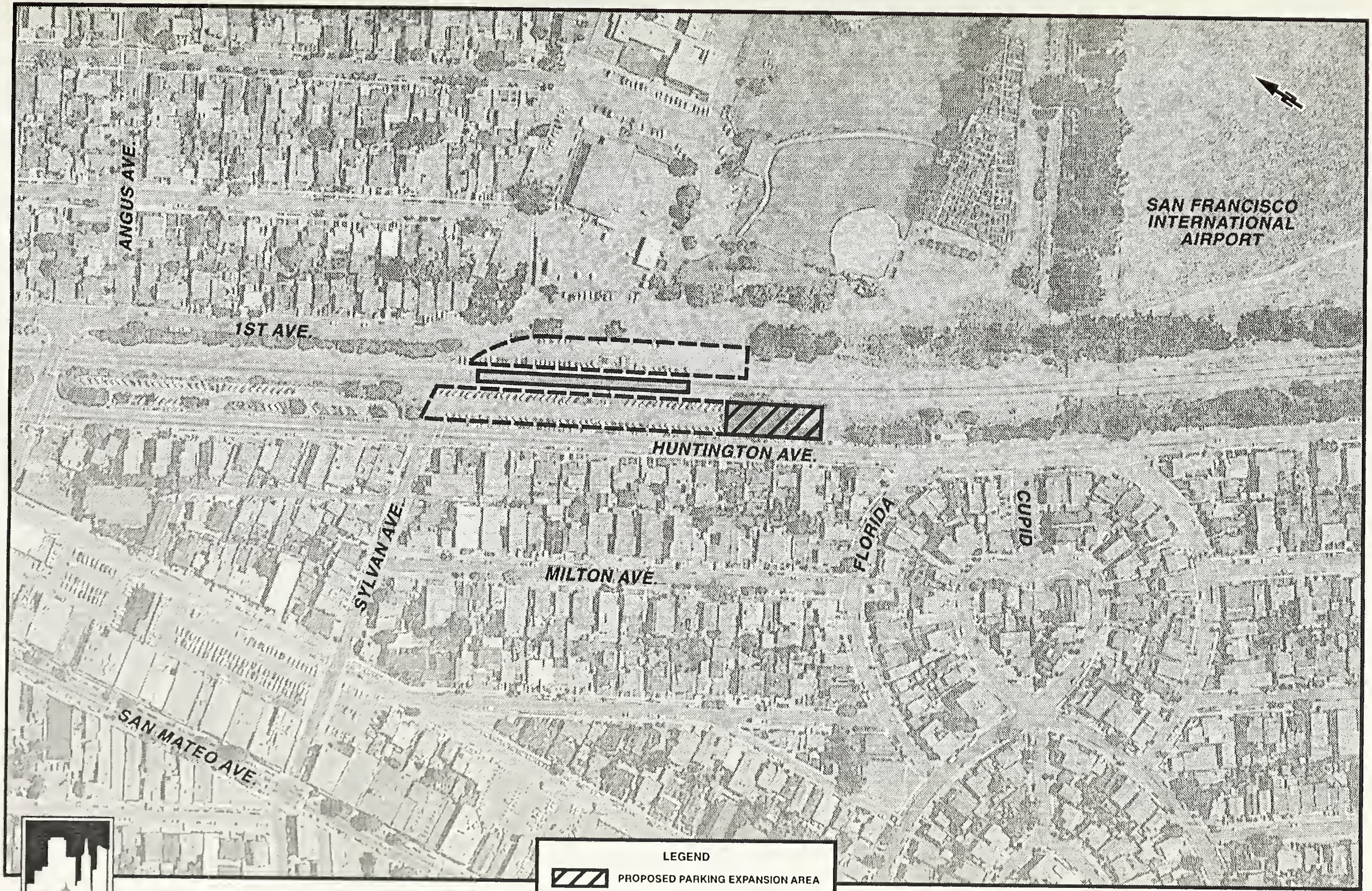
7.3.4 Broadway Station (City of Burlingame)

The mitigation proposed for increased parking demand at the Broadway Station is to provide parking expansion at three locations in the vicinity of the station, as shown in Figure 7.3-4. On the west side of the CalTrain alignment, north of Broadway, a joint City/CalTrain lot would be improved to accommodate 30 vehicles by paving an underutilized dirt and gravel area immediately north of the designated CalTrain parking spaces. On the east side of the CalTrain alignment, areas adjacent to the tracks both north and south of Broadway would be improved to accommodate approximately 100 vehicles (see Figure 7.3-4).

Parking capacity at the Broadway Station is proposed to be expanded by 130 spaces. Although there is no projected 2010 parking deficit at this station with the proposed CalTrain Extension Alternative, these spaces would provide capacity to accommodate the projected overflow in 2010 parking demand at nearby stations, such as Burlingame and San Mateo

Impacts and Mitigation

Moderate grading, asphalt paving, drainage improvements and lighting would be required to expand parking at the Broadway Station. These activities would be confined to each site or other off-street vacant or parking areas and would not substantially affect adjacent land uses or traffic operations on California Drive or Broadway. Removal of underground fuel storage tanks during construction could involve excavating contaminated soils. Fuel hydrocarbons in the soils could affect worker health and safety and fuel may prevent discharge into the sanitary sewer of any effluents generated during excavation.

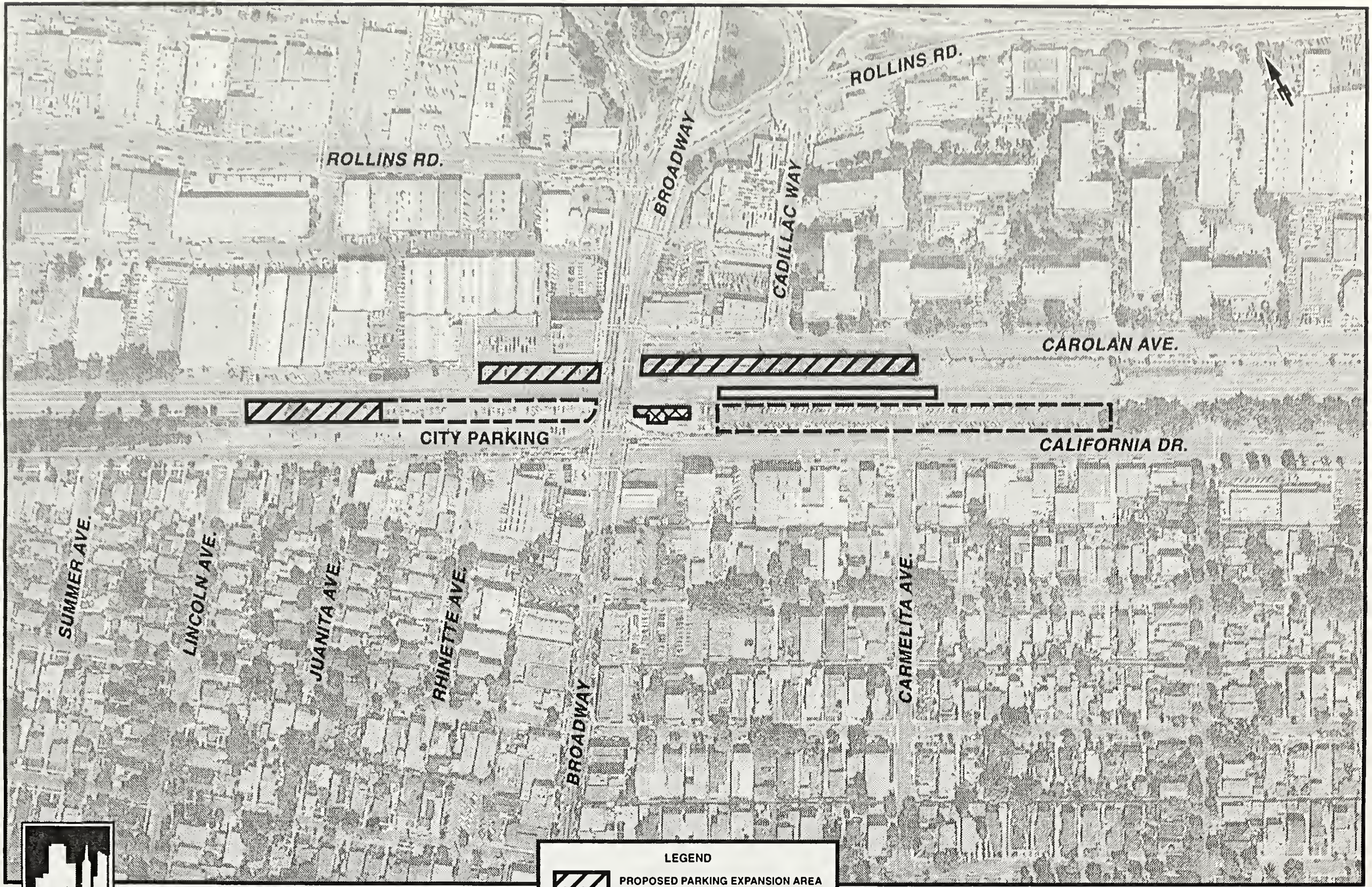

SAN FRANCISCO INTERNATIONAL AIRPORT
ANGUS AVE.
1ST AVE.
HUNTINGTON AVE.
SYLVAN AVE.
FLORIDA
CUPID
MILTON AVE.
SAN MATEO AVE.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
EXISTING CALTRAIN PARKING LOT
STATION PLATFORM
STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SAN BRUNO STATION

FIGURE 7.3-3


ROLLINS RD.
ROLLINS RD.
BROADWAY
CADILLAC WAY
CAROLAN AVE.
CITY PARKING
CALIFORNIA DR.
SUMMER AVE.
LINCOLN AVE.
JUANITA AVE.
RHINETTE AVE.
BROADWAY
CARMELITA AVE.

LEGEND

- ▨ PROPOSED PARKING EXPANSION AREA
- ☐ EXISTING CALTRAIN PARKING LOT
- ▭ STATION PLATFORM
- ⊠ STATION STRUCTURE

CALTRAIN SAN FRANCISCO DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

BROADWAY STATION

FIGURE 7.3-4

Mitigation of potential hazardous materials impacts would be required. Prior to construction, the potential presence of contaminants in soil and groundwater would be investigated. Based on the investigation results, a mitigation plan would be developed to establish guidelines for the disposal of contaminated soil, the discharge, if any, of contaminated effluent, and to address potential human health and safety issues that may arise as a result of contact with contaminated soil or effluent.

Soils removed during excavation and grading would be stockpiled, sampled as necessary to meet landfill acceptance criteria, and deposited offsite in an appropriate landfill or recycling facility. Materials left onsite for extended periods would be covered and dust control measures would be implemented during the construction period. Removed soil would be transported by licensed waste haulers under state manifests or bills of lading, as required. Chemical test results for groundwater samples would be used to obtain a batch discharge permit from the City of Burlingame and to evaluate requirements for treatment prior to discharge to the sanitary sewer. Workers performing activities on site that may involve contact with contaminated soil or effluents would be required to have appropriate health and safety training in accordance with 29 CFR 1910.120. See Section 5.21.14 for additional detail on hazardous materials mitigation measures that would apply to underground fuel storage sites.

The City of Burlingame does not have formal guidelines, or standards, for determining when traffic impacts attributable to a project would be considered substantial and require mitigation. Traffic impacts are typically evaluated on a case-by-case basis. The California/Broadway intersection serving the CalTrain station is a potential problem location in 2010. The intersection would operate at an unacceptable level of service in the PM peak under both the No-Build Alternative and the CalTrain Extension Alternative with the parking expansion in place. Operations would be affected by an increase in station traffic due to parking expansion, but the incremental impact is relatively small. The need for traffic mitigation improvements would not be attributed to the proposed parking expansion. Therefore, no additional mitigation of traffic impacts is recommended.[2]

Other impacts from parking expansion are not considered substantial.

7.3.5 Burlingame Station

The expansion proposed here would partially accommodate the projected 2010 parking deficit of 216 spaces by providing three new areas for station parking: along the CalTrain alignment off of West Lane between the station and Howard Avenue, along the CalTrain alignment off of East Lane between the station and Howard Avenue, and in a triangular-shaped lot on the east side of the CalTrain alignment just south of Howard Avenue. These locations are shown in Figure 7.3-5.

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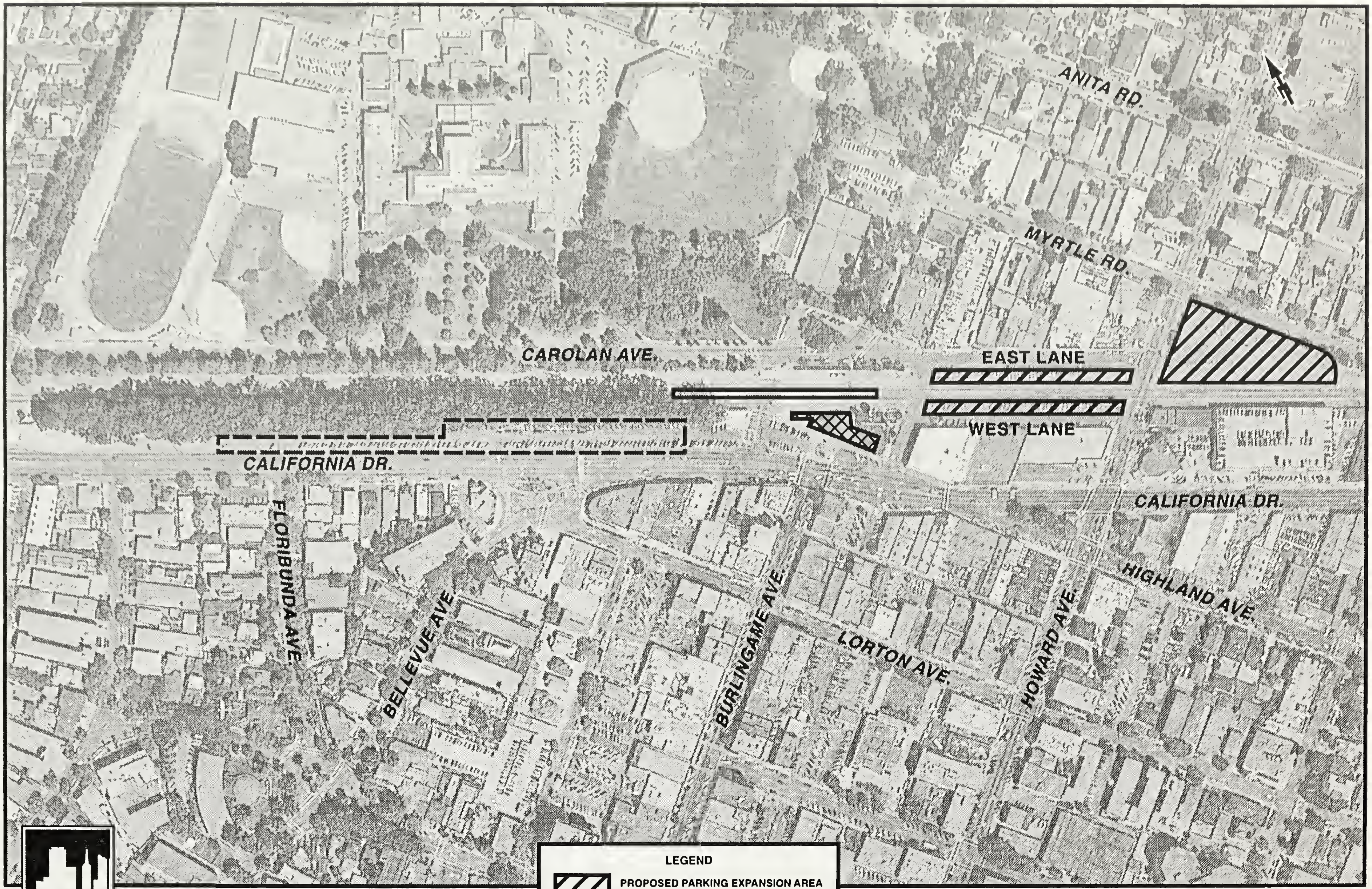
[2] Geometric improvements that would improve traffic operations under both the No-Build and Build alternatives would include adding a second westbound left-turn lane or a second westbound through lane on Broadway.


ANITA RD.
MYRTLE RD.
CAROLAN AVE.
EAST LANE
WEST LANE
CALIFORNIA DR.
CALIFORNIA DR.
HIGHLAND AVE.
HOWARD AVE.
LORTON AVE.
BURLINGAME AVE.
BELLEVUE AVE.
FLORIBUNDA AVE.

LEGEND

▨	PROPOSED PARKING EXPANSION AREA
⬚	EXISTING CALTRAIN PARKING LOT
▭	STATION PLATFORM
▩	STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

BURLINGAME STATION

FIGURE 7.3-5

The three lots have a combined parking capacity of approximately 175 spaces. Remaining unmet parking demand at Burlingame Station could be accommodated at the adjacent Broadway Station to the north.

Moderate grading, asphalt paving, drainage improvements and lighting would be required to expand parking along East Lane and West Lane. The reconstruction of parking surfaces, including paving, would typically be completed within five days. Additional improvements could take somewhat longer.

Improvements to the lot south of Howard Avenue would include removal of the existing loading ramp. Construction would be staged and operated from within the limits of the property whenever possible. The duration of construction is estimated at four to six weeks.

Impacts and Mitigation

Construction activity would temporarily disrupt traffic operations and potentially affect business access along East and West lanes since construction equipment and crews would need to operate along the existing roadways. Some disruption of local traffic to and from businesses and residences along Howard Avenue and Myrtle Road would potentially result during construction of the expansion lot south of Howard Avenue. Poor traffic operations at the Burlingame/California intersection are projected under the No-Build Alterative as well as with the expanded parking in place in 2010. Traffic associated with the expanded parking would contribute marginally to increased vehicle delay.

Geometric improvements are not proposed since they would have substantial right-of-way impacts. However, improved signing is recommended to enhance circulation in the area around the station. This would include signs along westbound Howard Avenue east of Myrtle Road, northbound California Drive south of Howard Avenue, and southbound California Drive north of North Lane to indicate the location of the additional parking south of the station. The signing would redirect vehicles to alternate routes to relieve congestion in the vicinity of the Burlingame/California intersection.

Interim replacement of parking displaced along West and East lanes would be provided in the proposed parking expansion lot south of Howard Avenue.

A landscaped buffer would be provided along south Myrtle Street between the west curb and the proposed parking lot. This would lessen any visual or related effects of parking on residences to the east.

Prior to constructing parking improvements, local businesses and residences would be contacted. Businesses along East and West lanes would be provided with parking relocation information and a construction schedule. Paving of parking areas along East and West lanes would be undertaken after business hours and on weekends to reduce impacts on the businesses that depend upon access from these two roadways.

7.3.6 San Mateo Station

The existing station parking is in two lots on opposites sides of the CalTrain tracks. The main lot west of the tracks, with approximately 165 spaces, is north of the intersection of First Avenue at Main Street. The second lot east of the tracks, with approximately 40 spaces, is north of the intersection of Second Avenue at Railroad Avenue (see Figure 7.3-6). The main lot is programmed for reconstruction as a downtown transit center, with approximately 65 more spaces added for CalTrain parking. This will provide 270 total parking spaces at San Mateo Station. The 2010 parking demand generated by the CalTrain Extension Alternative is projected to be approximately 332 spaces, leaving a parking deficit of approximately 62 spaces.

Because there is projected to be excess parking capacity at nearby stations in the future, no mitigation of the 2010 parking deficit at San Mateo Station is proposed. As noted, allowing CalTrain parking at the Burlingame Station in areas leased from the City and County of San Francisco would more than accommodate projected demand at this location. Broadway Station to the north of Burlingame Station would also have available parking capacity for CalTrain commuters from the central portion of the county. Approximately one mile south of the San Mateo Station, the Hayward Park Station is programmed for relocation with the addition of up to 200 parking spaces for CalTrain users.[3] Station construction has been delayed following the acquisition of CalTrain by the JPB but is expected to take place in the near future pending an agreement between the JPB and Caltrans. The new Hayward Park Station also could be expected to accommodate some overflow from the San Mateo Station and not require substantial out-of-direction travel for potentially diverted vehicles.

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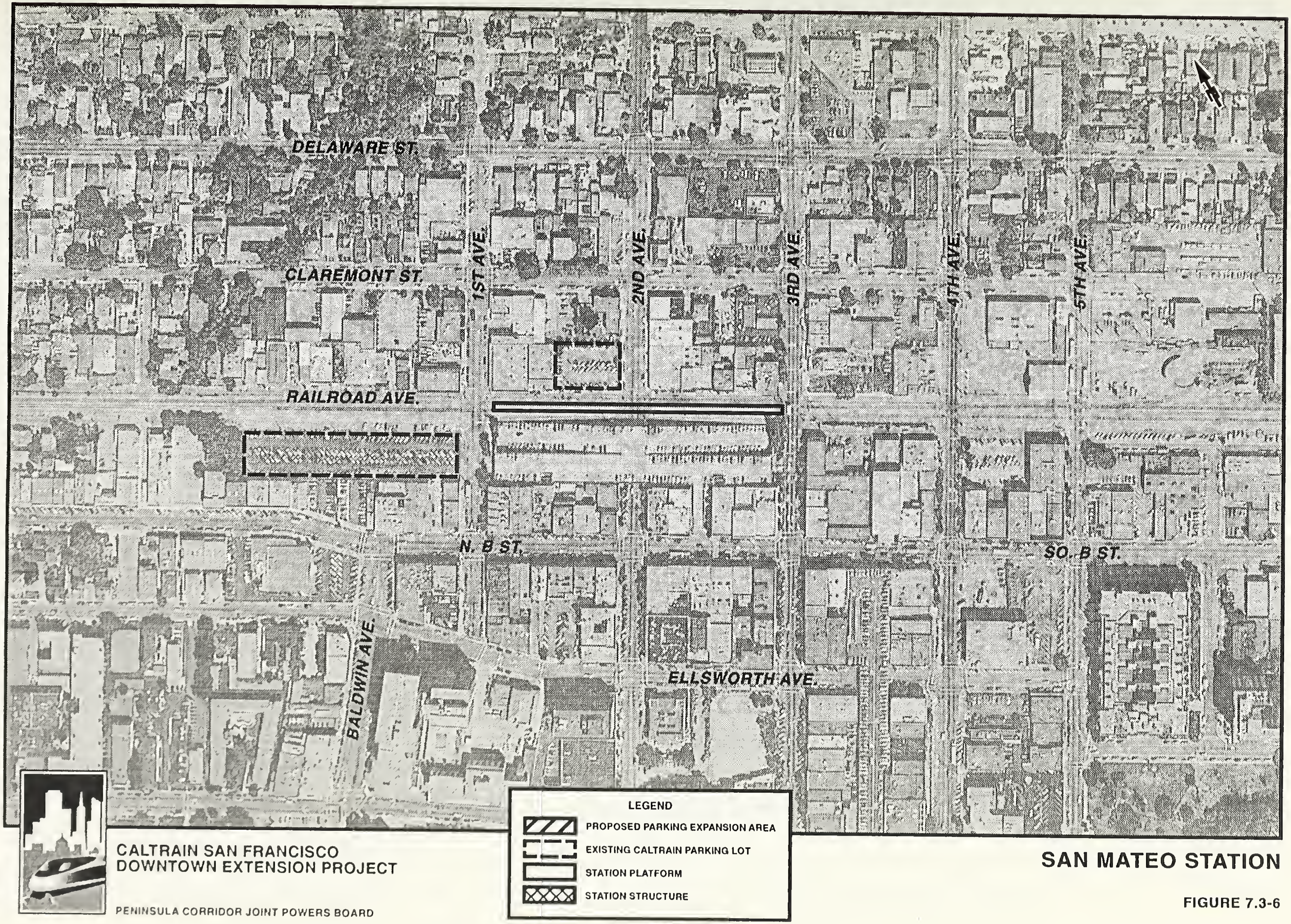
[3] The existing station is at 16th and South B Street in San Mateo and has no designated parking. The new station would be at Concar Drive and SR 92, approximately two blocks south, and be accessible from SR 92 at the SR 82/El Camino Real interchange or the slip ramps to Concar Drive and Pacific Boulevard.


DELAWARE ST.
CLAREMONT ST.
RAILROAD AVE.
1ST AVE.
2ND AVE.
3RD AVE.
4TH AVE.
5TH AVE.
N. B ST.
SO. B ST.
ELLSWORTH AVE.
BALDWIN AVE.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
▭ EXISTING CALTRAIN PARKING LOT
▭ STATION PLATFORM
▩ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SAN MATEO STATION

FIGURE 7.3-6

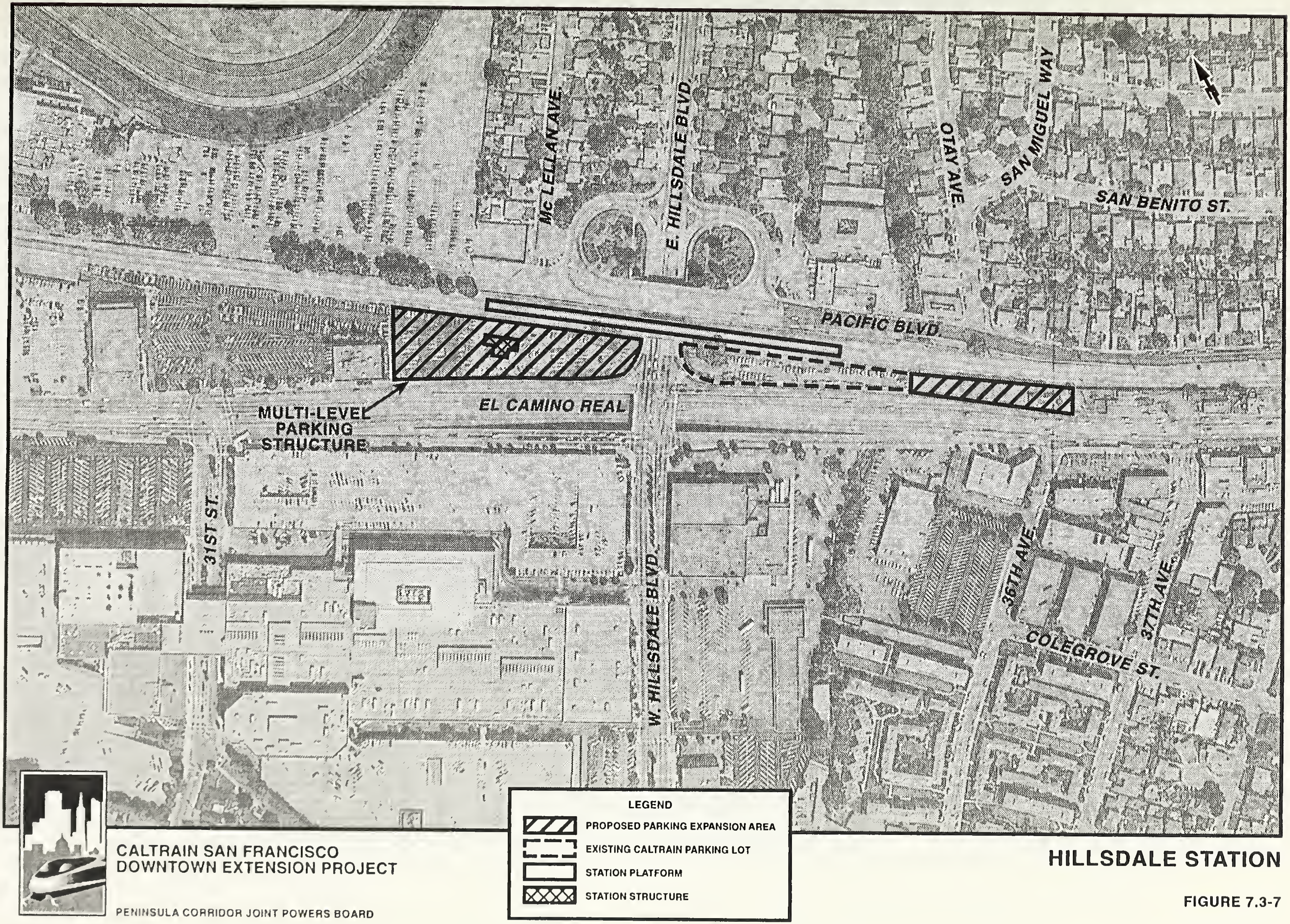
7.3.7 Hillsdale Station (City of San Mateo)

Under No-Build conditions, the supply of parking for CalTrain commuters at Hillsdale Station would be substantially below projected 2010 demand. Under the CalTrain Extension Alternative, the Hillsdale Station is projected to experience the greatest increase in 2010 parking demand of any CalTrain station. On the order of 556 additional parking spaces would be required to fully meet demand under the CalTrain Extension Alternative. Two parking expansion components are proposed as mitigation for this projected parking deficit: (1) development of the parcel between CalTrain and El Camino Real immediately south of the existing station for surface parking (60 spaces), and (2) construction of a multi-level parking structure on the station's north parking lot and part of the adjacent private parcel (496 spaces; see Figure 7.3-7).

The expansion area south of the existing Hillsdale Station, recently acquired by the San Mateo County Transportation Authority (June 1996) on behalf of the JPB, would be improved as a permanent surface lot with only minor improvements required for an access drive opposite 36th Avenue. The expansion area at the north parking lot and north of the station would be improved following completion of improvements to the south lot. The existing parking lot is a JPB easement from Caltrans. The area north of the station includes both public and private parcels. The San Mateo County Transportation Agency recently acquired on behalf of the JPB the east portion of the parcel (June 1996) as part of a larger property acquisition extending along the west CalTrain right-of-way from the Hillsdale Station to 25th Avenue. The west portion of the parcel is private parking for a restaurant.

Impacts and Mitigation

Moderate grading, asphalt paving, and possibly drainage and lighting improvements would be required to expand parking at the south expansion area. Demolition and removal of one existing structure, currently vacant, would be required. This activity would be confined to the site or to the existing adjacent CalTrain parking lots. Construction of surface parking improvements is not anticipated to have a major effect on adjacent land uses or traffic operations along El Camino Real. Construction of the parking structure on the proposed north expansion area would displace existing CalTrain surface parking and parking for restaurant customers. Construction activity would also generate noise and dust that would potentially adversely affect restaurant customers.


McLELLAN AVE.
E. HILLSDALE BLVD
OTAY AVE.
SAN MIGUEL WAY
SAN BENITO ST.
PACIFIC BLVD.
EL CAMINO REAL
MULTI-LEVEL PARKING STRUCTURE
31ST ST.
W. HILLSDALE BLVD.
36TH AVE.
37TH AVE.
COLEGROVE ST.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
┆ EXISTING CALTRAIN PARKING LOT
▭ STATION PLATFORM
▩ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

HILLSDALE STATION

FIGURE 7.3-7

Loss of parking during the construction period would be mitigated by providing expanded parking within the recently acquired CalTrain right-of-way along the west side of the tracks. Although currently used by both the restaurant and a cinema located just north of 31st Street, the right-of-way would be improved for additional parking through the Bay Meadows Station area farther to the north. Shared-use of existing cinema and restaurant parking would be pursued for CalTrain users who are displaced from the north parking lot during the period of construction. Potential noise and dust impacts to restaurant users would be minimized by limiting construction next to the restaurant to normal weekday work hours when patronage tends to be lower than during evenings and on weekends, and by implementing the air quality maintenance measures described in Section 5.21.8.

Traffic generated by parking expansion at the Hillsdale Station would potentially increase congestion on local streets and adversely affect intersection operations. The City of San Mateo has a policy of maintaining at least LOS D and a volume-to-capacity ratio of 0.85 at major arterial intersections.[4] If the desirable level of service is exceeded as a result of project generated traffic, then mitigation measures may be required, including roadway improvements, impact fees or off-site improvements. Alternatively, if the acceptable level of service at an intersection is already exceeded prior to the project being implemented and project-related mitigation traffic increases the volume-to-capacity ratio by 0.02 or more, mitigation may be required to restore the volume-to-capacity ratio to its original level (City of San Mateo General Plan, Circulation Element Policy C2.8).

The proposed expansion of parking at the Hillsdale Station under the CalTrain Extension Alternative is projected to increase traffic congestion moderately at the El Camino Real northbound ramps/East Hillsdale Boulevard intersection. The volume-to-capacity ratio would increase from 0.87 under the No-Build Alternative to 0.89 with the project-related parking expansion in the PM peak hour in 2010. This is above the acceptable congestion level and exceeds a 0.02 or more increase in the volume-to-capacity ratio for the intersection. Mitigation is required according to city General Plan, Circulation Element policies.

Improved channelization of right-turn traffic would be implemented to improve traffic flow at the intersection and thereby eliminate the impact of increased traffic attributable to parking expansion at the station. On the northbound El Camino Real off-ramp, lane restriping is recommended to allow heavy right-turning movements (controlled by a "yield" sign) to separate from through and left-turning vehicles (controlled by a traffic signal) farther upstream from the intersection. A shorter and narrower left-turn bay would allow more pavement area for extending a right-turn lane south. This improvement would be expected to improve the PM peak hour volume-to-capacity ratio at the intersection to 0.85 under the CalTrain Extension Alternative. (Note: Redevelopment plans for portions of the Bay Meadows race track and grounds to the northeast of the Hillsdale Station, described in the Draft Impact Report for the Bay Meadows Specific Plan & Route 101/Hillsdale Boulevard Interchange Modifications Project [City of San Mateo, October 1996], include proposed improvements to the El Camino Real ramps to Hillsdale Boulevard as mitigation for increased site traffic. The improvements include widening and extending the northbound El Camino Real off-ramp right-turn lane onto Hillsdale Boulevard, similar to the mitigation proposed for the expansion of CalTrain parking. Implementation of such mitigation for the Bay Meadows Specific Plan prior to implementation of Hillsdale Station parking improvements would likely obviate the need for further mitigation of traffic impacts at this intersection under the CalTrain Extension Alternative.)

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[4] San Mateo General Plan Circulation Element, Section E. Roadway Improvements. The Circulation Element identifies exceptions to these guidelines for acceptable V/C ratios. The intersections included in this analysis are not included among the exceptions.

Improved signing and allowing parking garage access through the El Camino Real/31st Street intersection would help reduce congestion at the ramp intersections with Hillsdale Boulevard. Informational signs indicating the parking garage location would be provided on southbound El Camino Real north of 31st Street and northbound El Camino Real south of 37th Avenue.

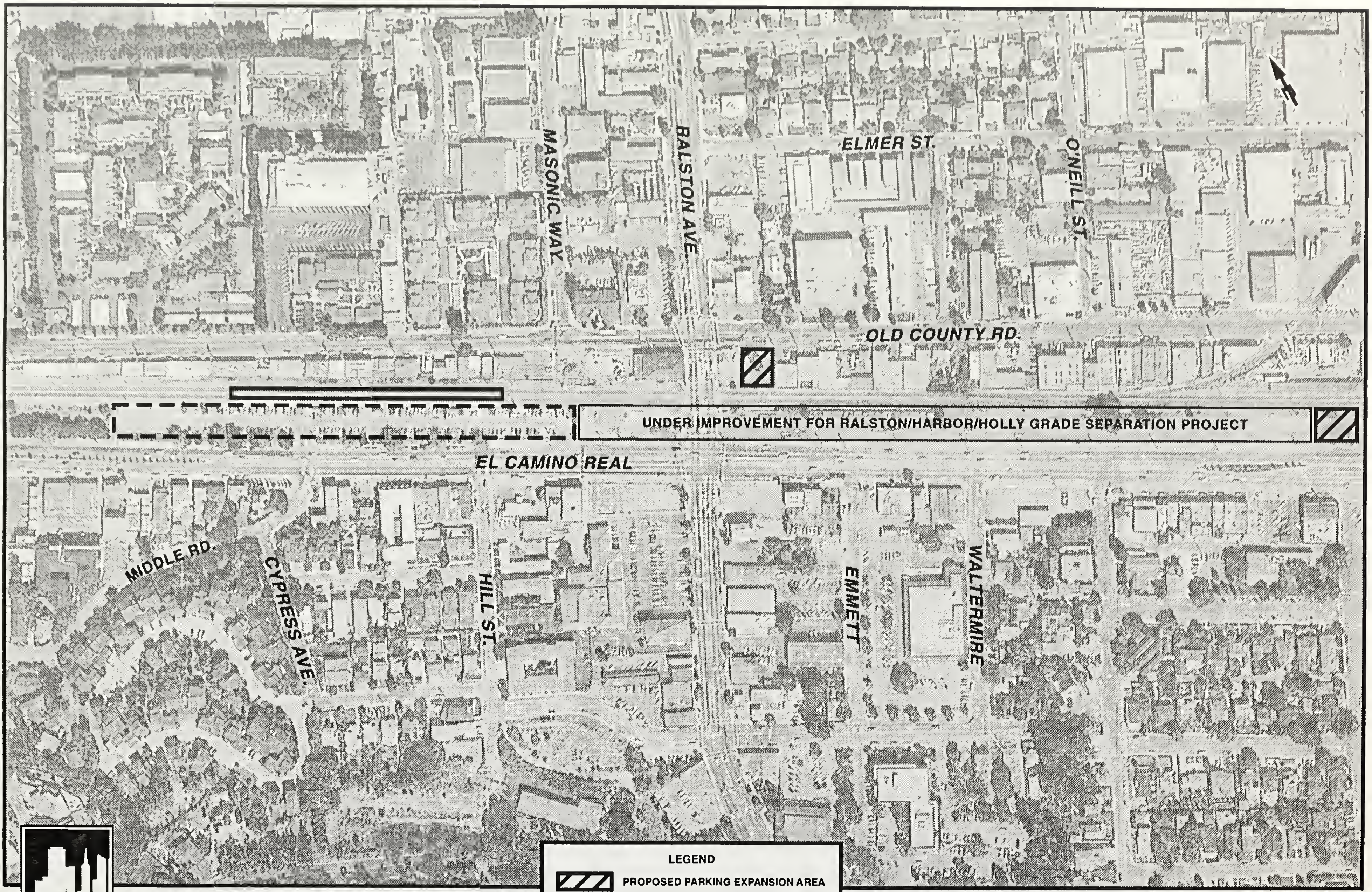
The permanent loss of private parking at the restaurant would be replaced by allowing shared-use of the CalTrain parking structure during weekday evenings and on weekends. The construction of the parking structure would require demolition of the existing CalTrain depot building on the north lot.

Other impacts associated with the proposed parking expansion are not considered major and would not warrant further mitigation.

7.3.8 Belmont Station

Belmont Station has an existing parking capacity of 203 spaces in a long, linear lot between the CalTrain tracks and El Camino Real, beginning about 200 feet north of Ralston Avenue (see Figure 7.3-8). Up to 200 spaces are being added to the parking supply as part of the in-progress Ralston Avenue/Harbor Boulevard/Holly Street grade separations project, providing a total parking capacity of approximately 403 spaces under the No-Build Alternative. This new parking will be between the CalTrain tracks and El Camino Real, just south and north of Ralston Avenue. The 2010 parking deficit at Belmont Station with the CalTrain Extension Alternative is projected to be on the order of 55 spaces.

Two areas are proposed for improvement to further expand parking capacity as mitigation for increased demand with CalTrain Extension Alternative. The new parking area under development between the CalTrain tracks and El Camino Real south of the Ralston Avenue grade separation improvements would be extended farther south, adding approximately 40 spaces. This property


ELMER ST.
O'NEILL ST.
MASONIC WAY
RALSTON AVE.
OLD COUNTY RD.
UNDER IMPROVEMENT FOR RALSTON/HARBOR/HOLLY GRADE SEPARATION PROJECT
EL CAMINO REAL
MIDDLE RD.
CYPRESS AVE.
HILL ST.
EMMETT
WALTERMIRE
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
EXISTING CALTRAIN PARKING LOT
STATION PLATFORM
STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

BELMONT STATION

FIGURE 7.3-8

has recently been disturbed to construct and operate a "shoe-fly" track, or mainline bypass, during construction of the grade separation at Ralston Avenue.

Another small area on the east side of the CalTrain tracks would be improved to add approximately 15 parking spaces at the station. This property, between the tracks and Old County Road on the south side of Ralston Avenue, is also being occupied temporarily for construction of the Ralston Avenue grade separation improvements. The proposed parking mitigation improvements would provide a total of 55 spaces, sufficient to cover the projected 2010 parking deficit.

Impacts and Mitigation

Moderate grading, asphalt paving, drainage and lighting improvements would be required to expand parking at each location. All major construction activity would take place on-site or be staged on adjacent CalTrain parking lots or rights-of-way. No major adverse impacts on local businesses or street traffic are anticipated during the construction period.

Increased auto trips to and from the Belmont Station resulting from parking expansion for the CalTrain Extension Alternative would add to congestion at the El Camino Real/Ralston Avenue and Old County Road/Ralston Avenue intersections. Both intersections are projected to operate at poor to failing levels of service in the future during some periods of the day, whether or not the CalTrain Extension Alternative is built. In the AM peak hour in 2010, El Camino Real/Ralston Avenue would operate at LOS C under both the No-Build and CalTrain Extension Alternative. In the PM peak, the intersection would operate at LOS F, or failure conditions, under both alternatives, with no noticeable difference in volume-to-capacity ratios. The Old County Road/Ralston Avenue intersection is projected to operate at LOS E in the AM peak hour in 2010, with a volume-to-capacity ratio of 1.02 under both the No-Build and the CalTrain Extension Alternative. In the PM peak, the intersection would operate at LOS E+ and LOS E under the No-Build and CalTrain Extension Alternative, respectively, with no major difference in volume-to-capacity ratio. The projected changes in intersection level of service and/or volume-to-capacity ratio attributable to project-related mitigation are not substantial, and therefore no mitigation of project-related mitigation traffic is proposed other than improved signing for park-and-ride users.

Signing improvements would be designed to redirect station-generated traffic away from the El Camino Real/Ralston Avenue intersection. Informational signs indicating access to the proposed expansion lot on the west side of the tracks, south of Ralston Avenue, would be provided south of O'Neill Street (the next major arterial to the south of Ralston) for northbound traffic on El Camino Real. Information signs would also be provided on Ralston Avenue east of Old County Road indicating the location of the expansion parking lot on the east side of the tracks that would be easily accessible by westbound traffic.

Other impacts associated with the parking expansion are also considered minor and do not warrant further mitigation.

7.3.9 San Carlos Station

On the order of 141 additional parking spaces are needed to meet 2010 parking demand at the San Carlos Station with the CalTrain Extension Alternative. As shown in Figure 7.3-9, parking expansion is proposed in the area between the CalTrain tracks and El Camino Real immediately south of the existing lot. This would add 155 spaces to the existing station supply of 285 spaces, for a total parking capacity of 440 spaces. The property was purchased by the San Mateo County Transportation Authority for construction of the Holly Street grade separation.

Impacts and Mitigation

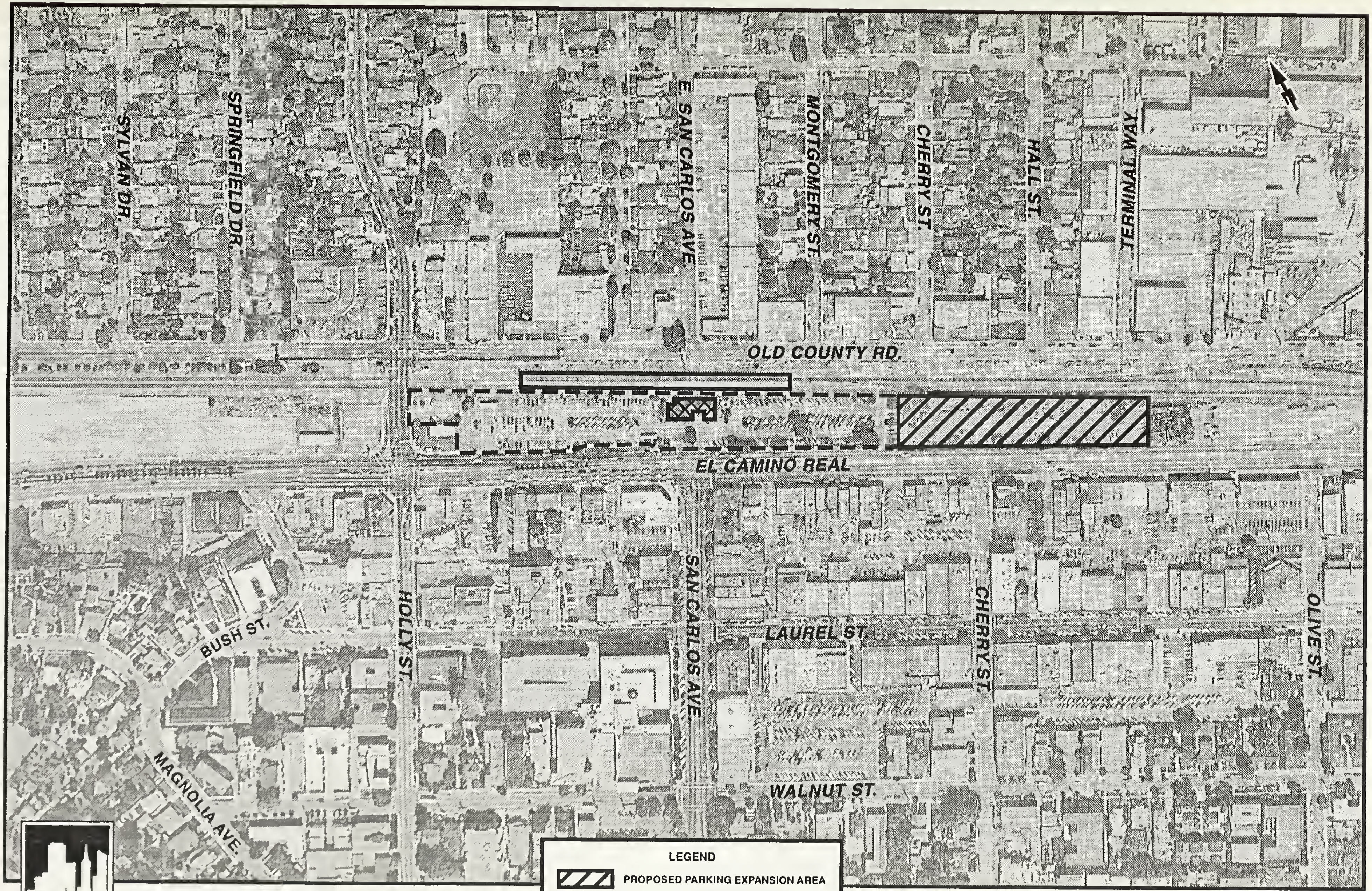
Construction would take place within the limits of the proposed parking expansion area or be staged from the adjacent vacant or adjacent CalTrain parking lot. No major disruption of businesses or traffic would be anticipated during the construction period.

Traffic generated by expanded CalTrain parking would potentially increase congestion on El Camino Real and other station access roadways. The City of San Carlos has a policy of maintaining at least LOS D at major intersections. Deterioration below this standard is considered an adverse impact potentially requiring mitigation. The El Camino Real/San Carlos Avenue intersection is the main access to the station and would be most affected by the proposed project-related mitigation. It is projected to operate at no worse than LOS D with project-related mitigation traffic in either the AM or PM peak hour in 2010 and, therefore, no additional mitigation of traffic impacts is warranted.

Other impacts associated with the parking expansion are also considered minor and do not warrant further mitigation.

7.3.10 Menlo Park Station

The Menlo Park Station includes parking for 147 vehicles, with no parking capacity improvements programmed in the foreseeable future. The projected 2010 parking demand under the CalTrain Extension Alternative would result in a 113-space deficit in parking supply. Additional parking of 150 spaces is proposed as mitigation on an approximately 1.25-acre parcel north of the station and Oak Grove Avenue, as shown in Figure 7.3-10.



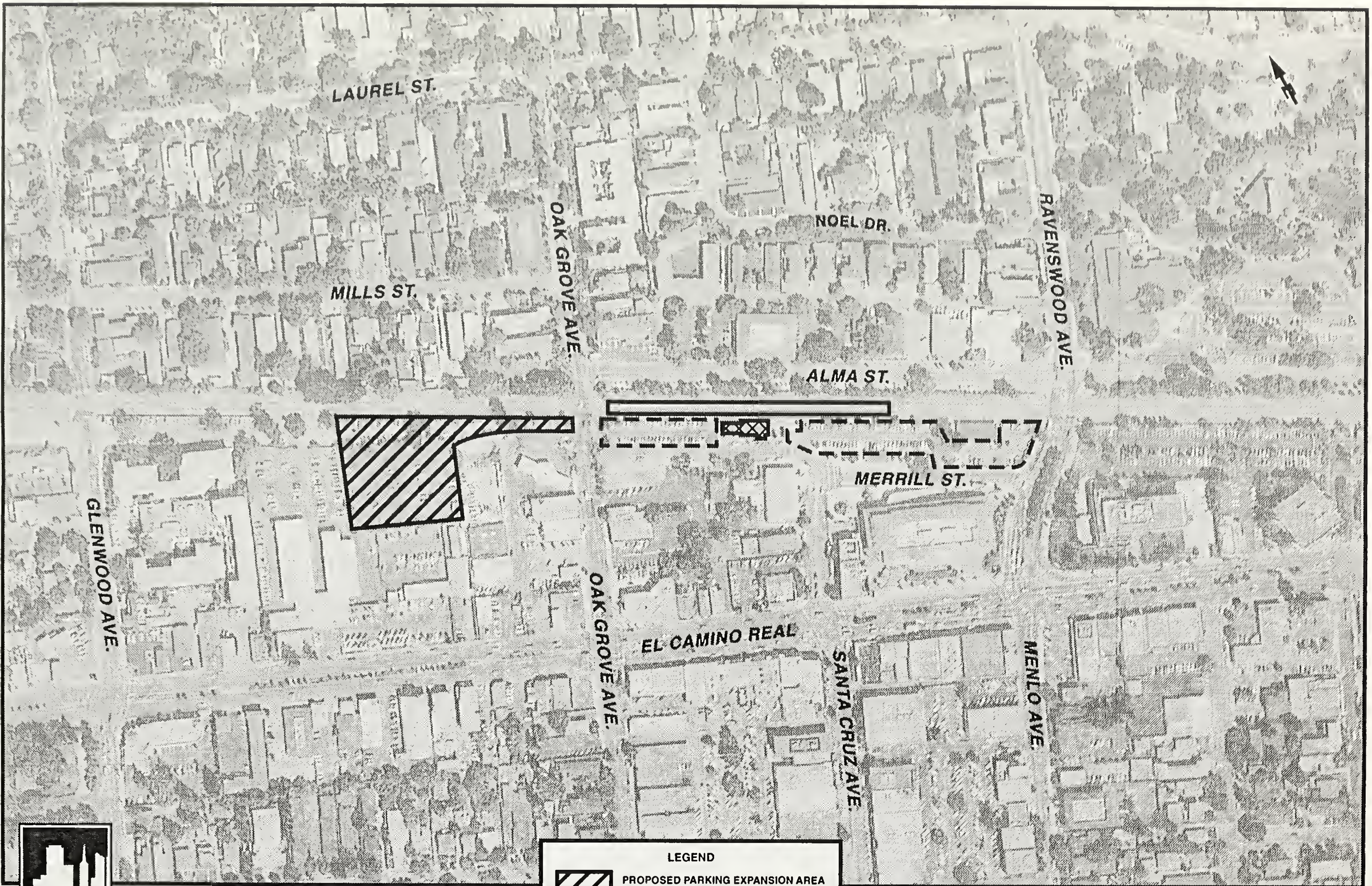
SYLVAN DR.
SPRINGFIELD DR.
E. SAN CARLOS AVE.
MONTGOMERY ST.
CHERRY ST.
HALL ST.
TERMINAL WAY
OLD COUNTY RD.
EL CAMINO REAL
BUSH ST.
MAGNOLIA AVE.
HOLLY ST.
SAN CARLOS AVE.
LAUREL ST.
CHERRY ST.
WALNUT ST.
OLIVE ST.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
EXISTING CALTRAIN PARKING LOT
STATION PLATFORM
STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SAN CARLOS STATION

FIGURE 7.3-9


LAUREL ST.
MILLS ST.
NOEL DR.
OAK GROVE AVE.
ALMA ST.
RAVENSWOOD AVE.
MERRILL ST.
GLENWOOD AVE.
OAK GROVE AVE.
EL CAMINO REAL
SANTA CRUZ AVE.
MENLO AVE.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
⬚ EXISTING CALTRAIN PARKING LOT
▭ STATION PLATFORM
⊠ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

MENLO PARK STATION

FIGURE 7.3-10

Impacts and Mitigation

Parking lot improvements would include clearing, grading, drainage, paving, lighting, and landscaping. Limited earthwork (and therefore limited use of heavy equipment) is anticipated, and the duration of construction would be two to three months. Construction activity would be staged on-site or within adjacent underutilized parking areas. Disruption of traffic along Oak Grove Avenue, El Camino Real, Alma Street or other local roadways and any effects on local businesses and residential uses would be minimal.

Menlo Park has a policy to maintain LOS D at all city-controlled signalized intersections during peak hours except for several intersections in special traffic corridors (all outside the station study area--*Menlo Park General Plan Policy Document*, Part I, Section II: Circulation and Transportation). The El Camino/Ravenswood and El Camino/Oak Grove intersections would fail to meet this policy threshold under both No-Build conditions and with the CalTrain Extension Alternative parking mitigation in place.

In prior planning studies the city has identified the problems of worsening congestion along El Camino Real near Ravenswood/Menlo Avenue and has proposed capacity improvements for future implementation that include a third through lane on El Camino Real through the intersection (Menlo Park Land Use and Circulation Elements, Modified Draft EIR--Circulation and Transportation). Carried through to Oak Grove Avenue, this improvement would result in at least LOS D conditions during the AM and PM peak hours in 2010 at both the El Camino/Oak Grove and El Camino/Ravenswood/Menlo intersections under both the No-Build Alternative and the CalTrain Extension Alternative. Since this improvement would be necessary to maintain acceptable operations even without expansion of parking at the Menlo Park CalTrain Station, it is not proposed as additional mitigation associated with parking expansion.

No other effects of the proposed parking expansion at Menlo Park Station have been identified that would warrant additional mitigation.

7.3.11 Palo Alto Station

Existing CalTrain parking at the Palo Alto Station is provided at four locations. Two lots are on the west (station building) side of the CalTrain alignment, north and south of University Avenue, and two other lots are on the east side of CalTrain between the tracks and Alma Street, north and south of University Avenue. Total capacity is 347 spaces. In the near term, the Santa Clara Valley Transportation Agency proposes to expand the bus transfer center in front of the station north of University Avenue, which would remove several parking spaces. Also, the city, Stanford University and Palo Alto Medical Foundation are considering plans to provide a new access road through the existing CalTrain parking lot south of University Avenue and west of the tracks, which would remove several more parking spaces. The future parking supply under the No-Build condition has been assumed to decrease by an estimated 25 spaces as a result. All available spaces are projected to be utilized by the year 2010.

With the CalTrain Extension Alternative, parking demand at the Palo Alto Station is projected to increase further, resulting in a projected parking deficit of 100 spaces by 2010. Two areas are proposed for surface parking lot construction as part of project-related parking mitigation: (1) immediately north of the existing "north" lot on the east side of the tracks opposite Everett Avenue (50 spaces), and (2) immediately south of the existing "south" lot on the east side of the tracks opposite Forest Avenue (50 spaces). These areas, shown in Figure 7.3-11, are owned by the JPB and San Mateo County Transportation Authority, respectively.

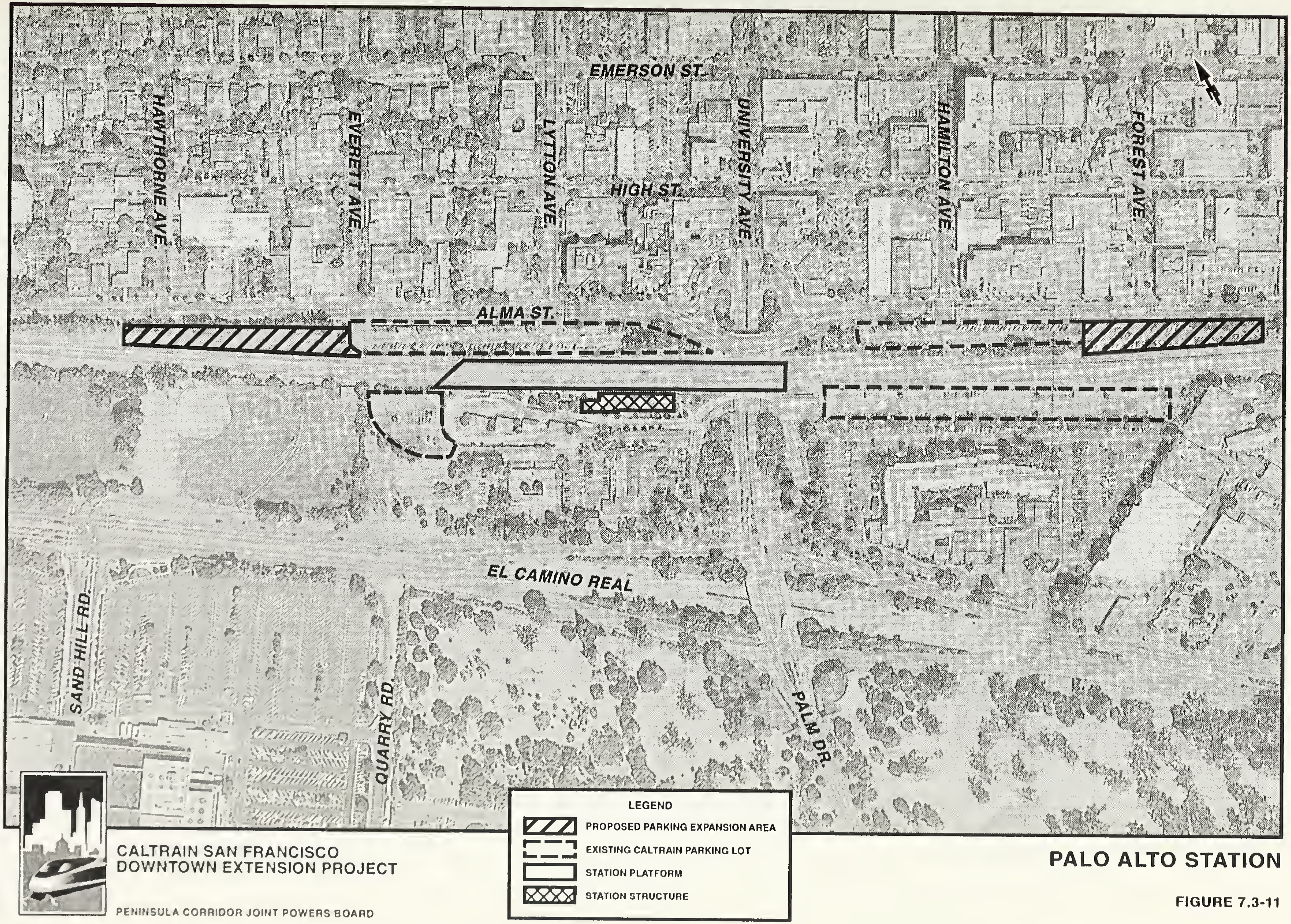
Impacts and Mitigation

Parking lot improvements would include clearing, grading, drainage, paving, lighting, and landscaping. Limited earthwork (and therefore limited use of heavy equipment) is anticipated, and the duration of construction would be two to three months. Construction activity at either location would be staged on-site or within the adjacent parking lot area. Disruption of traffic along Alma Street and effects on local businesses and residential uses would be minimal.

The City of Palo Alto has established thresholds for total traffic at major intersections that are indicators of major impacts and the need to consider traffic mitigation. Total traffic is the sum of all approach volumes during the PM peak hour. If the threshold for an intersection is exceeded, level of service analysis and evaluation of mitigation measures to improve traffic conditions or reduce traffic volumes are required. The PM peak hour threshold for the Alma/Lytton intersection is 2,599 vehicles per hour. Projected traffic under the CalTrain Extension Alternative with parking mitigation in 2010 is 2,420, or less than the threshold. The PM peak hour threshold for the Alma/Hamilton intersection is 2,902 vehicles per hour. Projected traffic under the CalTrain Extension Alternative with expanded parking in 2010 is 2,770, or less than the threshold. In both instances volumes are below impact thresholds and no additional traffic mitigation measures would be warranted.

The south expansion area is used for vehicle storage by a local car repair and towing firm. Vehicle storage would be displaced by CalTrain parking expansion. The business has a month-to-month lease with the Transportation Authority and would be provided at least a 30-day notice of lease termination for lot construction. The north expansion area has a number of trees along its frontage with Alma Street; mature trees next to the roadway would be retained and the vegetative buffer maintained in most places.

Other effects of the proposed expansion of CalTrain parking are not considered major and do not warrant further mitigation.


EMERSON ST.
HAWTHORNE AVE.
EVERETT AVE.
LYTTON AVE.
HIGH ST.
UNIVERSITY AVE.
HAMILTON AVE.
FOREST AVE.
ALMA ST.
EL CAMINO REAL
SAND HILL RD.
QUARRY RD.
PALM DR.
LEGEND
PROPOSED PARKING EXPANSION AREA
EXISTING CALTRAIN PARKING LOT
STATION PLATFORM
STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

PALO ALTO STATION

FIGURE 7.3-11

7.3.12 California Avenue Station (City of Palo Alto)

Additional parking the California Avenue Station to partially mitigate the projected 2010 parking deficit of 64 spaces is proposed in an area along the CalTrain alignment west of the existing parking lot. This area, shown in Figure 7.3-12, is vacant, unimproved CalTrain right-of-way on the south side of the tracks. The new lot would have a parking capacity of approximately 45 spaces. Access easements would be required from the west end of the lot to Park Boulevard. The remaining deficit could be handled with street parking along High Street, one block east of Alma Street (about 20 vehicles), and with the excess capacity at the nearby proposed San Antonio Station.

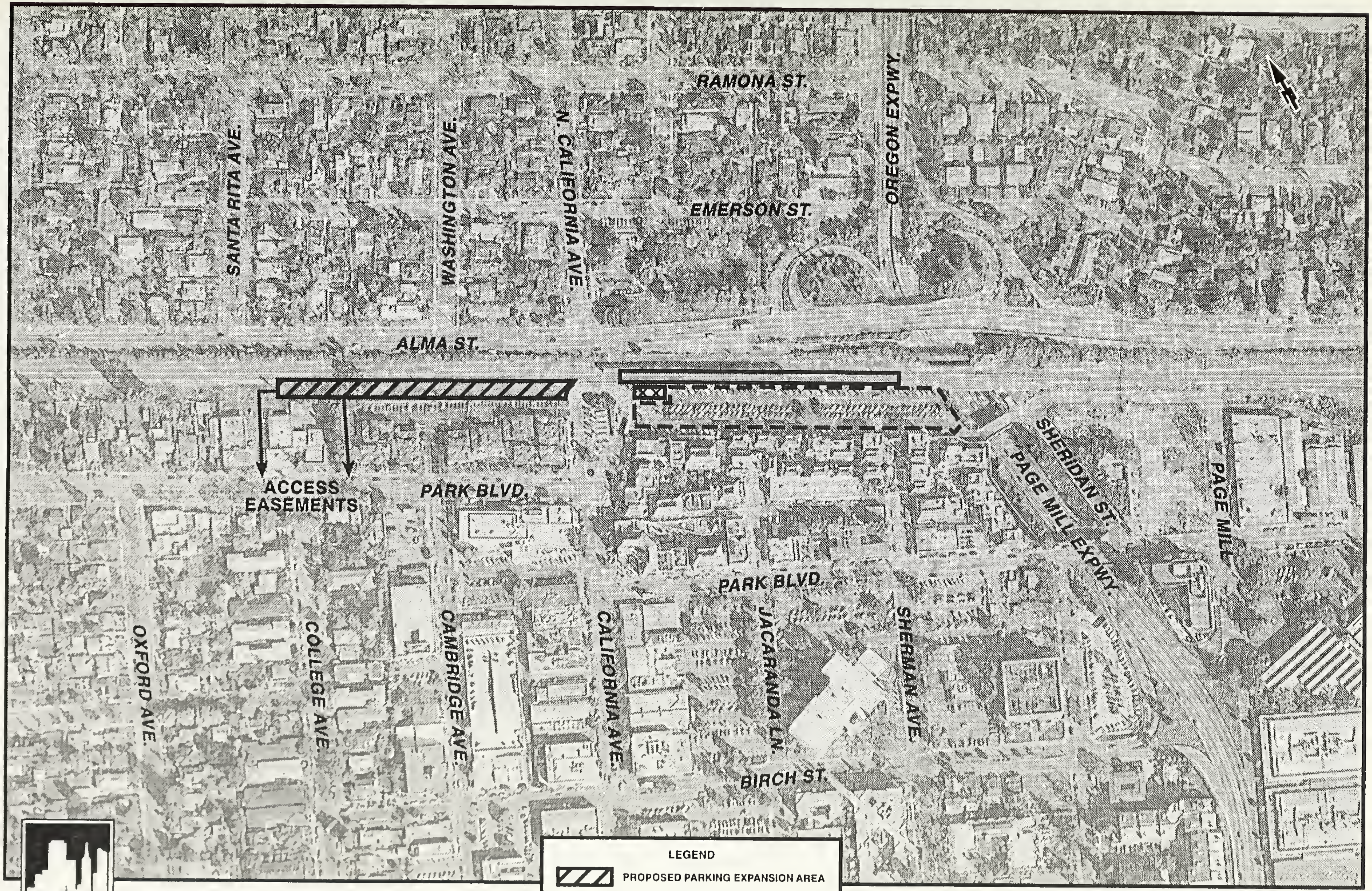
Impacts and Mitigation

Moderate grading, asphalt paving, drainage improvements and lighting would be required to expand parking at the California Avenue Station. Construction would be staged and operated from within the limits of the property whenever possible, with limited disruption of local traffic along Park Boulevard and California Avenue. Because the parking area is off the street, the only impact to the surrounding streets would be minor and would consist of construction equipment and trucks traveling to and from the site. Construction would not have an appreciable effect on adjacent land uses. Construction is estimated to take place over a four- to six-week period. Increased commuter traffic to and from the station would not have a substantial impact on local intersection operations. Although the El Camino Real/California Avenue intersection is projected to exceed the City's threshold for intersection capacity of 4,807 vehicles per hour in the PM under the No-Build Alternative and with proposed CalTrain parking expansion in 2010, the incremental traffic generated by parking mitigation is minor at this location. The projected increases in traffic elsewhere are also projected to be minor due to the overall dispersal of station traffic along local roadways. The access easements between the parking expansion lot and Park Boulevard would increase peak hour off-street traffic through the commercial/industrial area along Park Boulevard. Two access points are proposed as a means to minimize any potential off-street traffic conflicts.

Other impacts attributable to parking mitigation for the CalTrain Extension Alternative are considered minor and also do not warrant mitigation.

7.3.13 Sunnyvale Station

The projected 2010 parking deficit of 204 spaces at the Sunnyvale Station from the CalTrain Extension Alternative is proposed to be accommodated through construction of a new lot south of the existing station and shared parking with the adjacent City of Sunnyvale parking lots. These


RAMONA ST.
OREGON EXPWY.
SANTA RITA AVE.
WASHINGTON AVE.
N. CALIFORNIA AVE.
EMERSON ST.
ALMA ST.
SHERIDAN ST.
PAGE MILL EXPWY.
PAGE MILL
ACCESS EASEMENTS
PARK BLVD.
PARK BLVD.
OXFORD AVE.
COLLEGE AVE.
CAMBRIDGE AVE.
CALIFORNIA AVE.
JACARANDA LN.
SHERMAN AVE.
BIRCH ST.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
┆ EXISTING CALTRAIN PARKING LOT
☐ STATION PLATFORM
▩ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

CALIFORNIA AVENUE STATION

FIGURE 7.3-12

locations are shown in Figure 7.3-13. The new CalTrain lot would have a capacity of approximately 110 spaces while lots proposed for shared use have a parking capacity of approximately 485 spaces.

The lot south of the station was recently improved by the City of Sunnyvale, who leases the land from the SPTCo. Few improvements would be necessary for its use for CalTrain. No improvements would be necessary to implement shared-use parking other than signing for CalTrain parking in the lots west of Evelyn.

Impacts and Mitigation

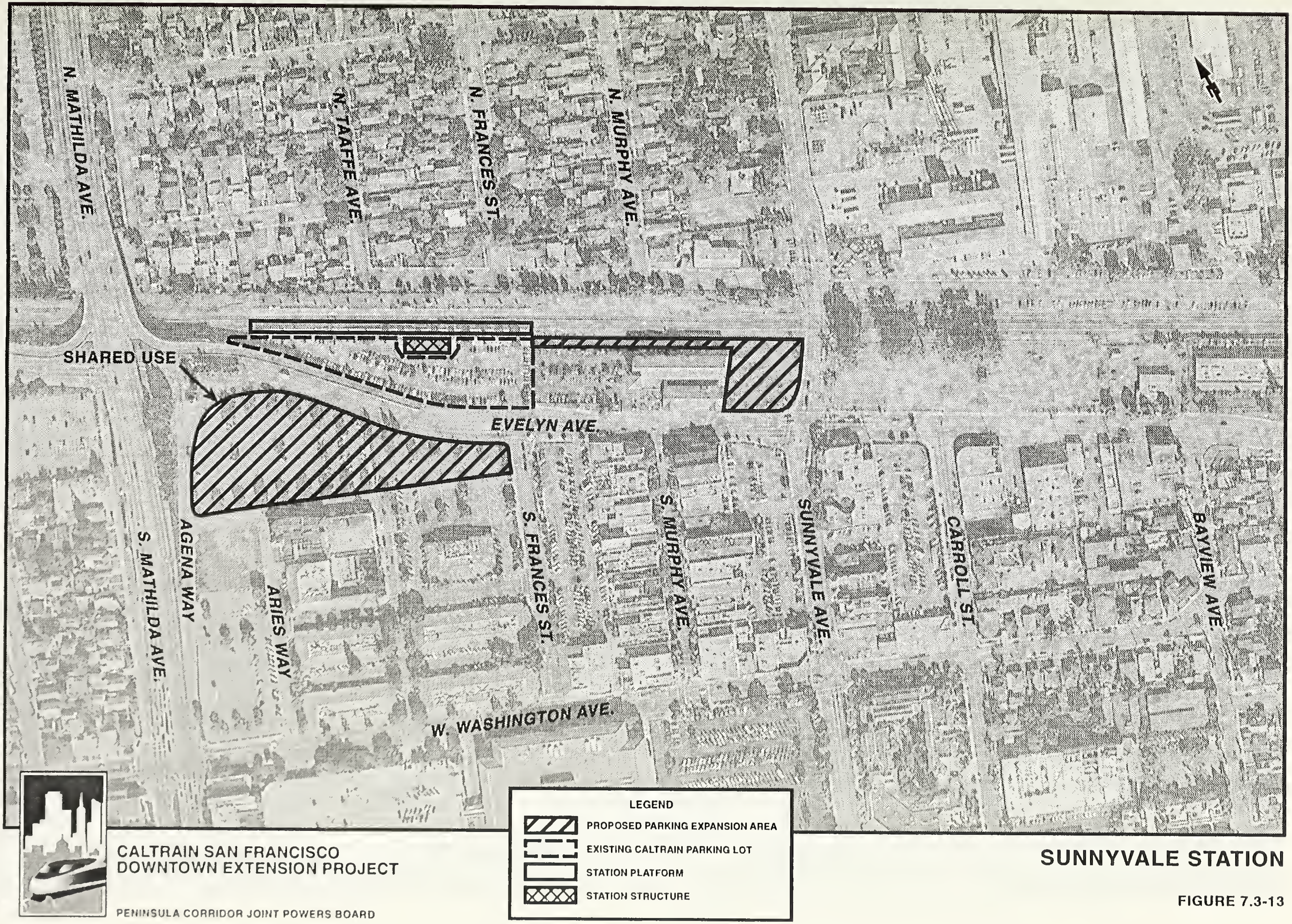
No major traffic impacts would result from long-term operation of the proposed expanded parking. The Evelyn Avenue/Sunnyvale Avenue intersection is projected to operate at LOS B in the AM peak hour and LOS D+ in the PM in 2010 under both the No-Build Alternative and CalTrain Extension Alternative.

Conversion of the south expansion area from private to public ownership would result in the loss of property tax revenues to local governments. The annual revenue loss would be on the order to $1,200. No other impacts from parking expansion at the Sunnyvale Station would be major and no mitigation of impacts is warranted.

7.3.14 Santa Clara Station

The oldest continuously operating passenger depot in California and dating back to 1864, the Santa Clara Depot is listed in the National Register of Historic Places (NRHP). It was determined to be eligible for inclusion in the NRHP under Criteria A (association with events that have made a significant contribution to the broad patterns of our history) and C (embodying distinctive characteristics of a type, period, or method of construction ... or that possess high artistic values) at the State level. The historic property boundary was recently expanded to include the Interlocking Control Towers, the Speed Shed, and the Utility Shed as contributory properties.

The projected 2010 parking deficit at the Santa Clara Station of 60 spaces is proposed to be accommodated by providing a new area for station parking along the CalTrain alignment northwest and southeast of the existing parking lot. The locations of the expanded parking and the historic facilities are shown in Figure 7.3-14. The area to the northwest is mostly paved and contains the control tower and the two sheds. The new lot would avoid disturbing these properties, with improvements beginning to the west of a buffer zone (on which the structures sit) between the proposed and existing parking areas. A new access drive would extend from the end of the proposed lot to El Camino Real. The northwest lot would have a capacity of approximately 50 spaces. The southeast lot would be contiguous with the existing CalTrain lot and be accessible from Palm Drive. Approximately 25 spaces would be provided, resulting in a total expanded parking supply of 75 spaces.

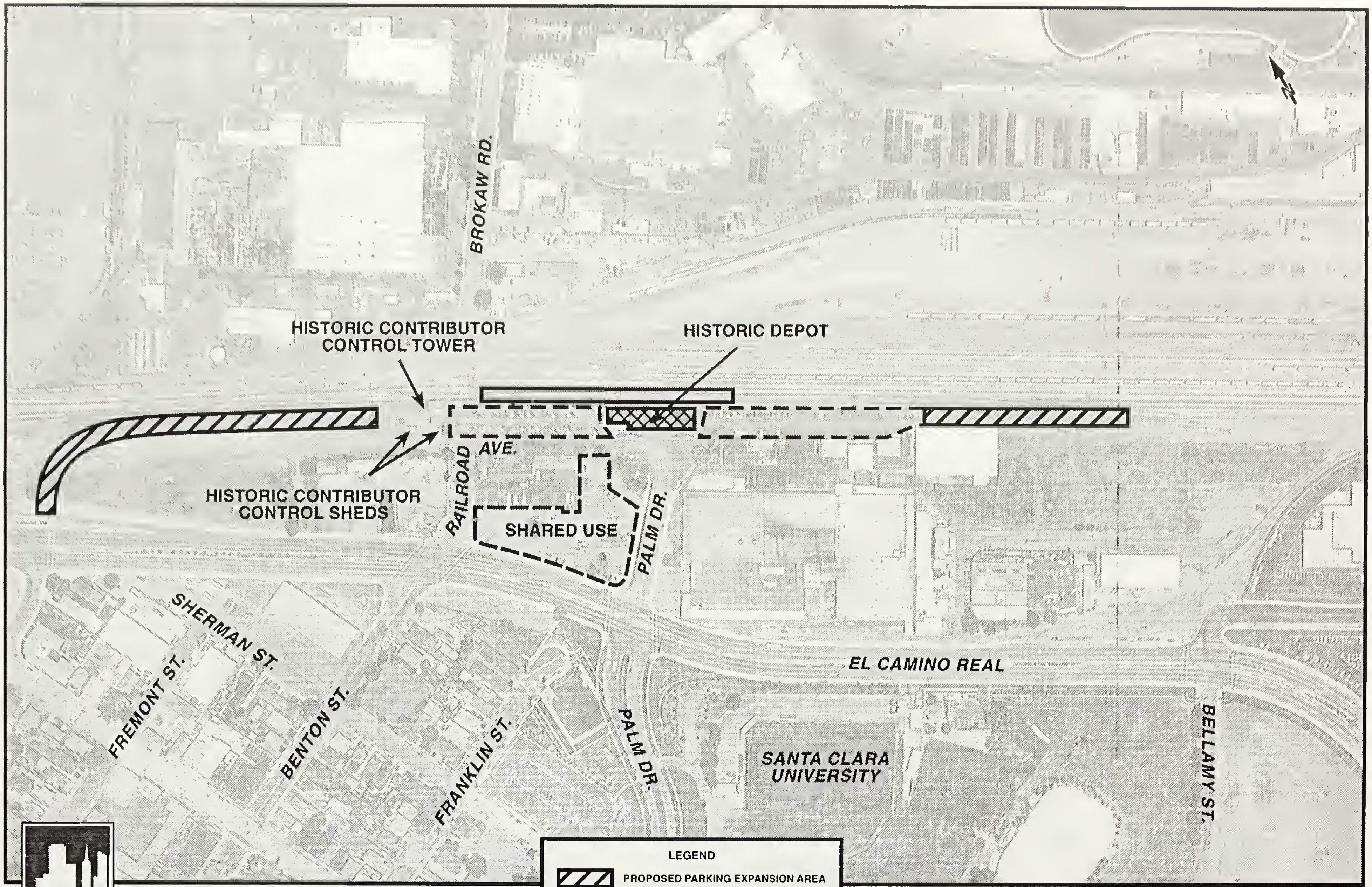

N. MATHILDA AVE.
N. TAAFFE AVE.
N. FRANCES ST.
N. MURPHY AVE.
SHARED USE
EVELYN AVE.
AGENA WAY
S. MATHILDA AVE.
ARIES WAY
S. FRANCES ST.
S. MURPHY AVE.
SUNNYVALE AVE.
CARROLL ST.
BAYVIEW AVE.
W. WASHINGTON AVE.
LEGEND
▨ PROPOSED PARKING EXPANSION AREA
EXISTING CALTRAIN PARKING LOT
STATION PLATFORM
STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SUNNYVALE STATION

FIGURE 7.3-13


BROKAW RD.
HISTORIC CONTRIBUTOR CONTROL TOWER
HISTORIC DEPOT
HISTORIC CONTRIBUTOR CONTROL SHEDS
RAILROAD AVE.
SHARED USE
PALM DR.
SHERMAN ST.
FREMONT ST.
BENTON ST.
FRANKLIN ST.
PALM DR.
EL CAMINO REAL
SANTA CLARA UNIVERSITY
BELLAMY ST.
N

LEGEND

▨ PROPOSED PARKING EXPANSION AREA

⬚ EXISTING CALTRAIN PARKING LOT

▭ STATION PLATFORM

▩ STATION STRUCTURE

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

PENINSULA CORRIDOR JOINT POWERS BOARD

SANTA CLARA STATION

FIGURE 7.3-14

Impacts and Mitigation

Moderate grading, asphalt paving, drainage improvements and lighting would be required to expand parking at the Santa Clara Station. Construction would be staged and operated from within the limits of the property whenever possible, with limited disruption of local traffic along Railroad Avenue. Because the parking area is off the street, the only impacts to the surrounding streets would be minor and consist of construction equipment and trucks traveling to and from the site. Construction is estimated to take place over a four- to six-week period. No effect on the historic depot complex is anticipated; construction activities would be controlled to ensure no effects to any of the historic structures. A Finding of Effect documenting this inclusion will be prepared and provided to the State Historic Preservation Officer (SHPO) for concurrence prior to circulation of the Final EIS.

Impacts related to parking mitigation traffic would be minor. Level of service at the El Camino Real/Benton Street intersection, which is along a primary access route to the station, is projected to be at least LOS C during both peak periods in 2010 under the CalTrain Extension Alternative. No traffic mitigation is warranted.

No other major impacts would result from long-term operation of the proposed additional parking at the Santa Clara Station. No additional mitigation measures are warranted.

CHAPTER 8: ENVIRONMENTAL JUSTICE

Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (Federal Register, February 16, 1994, p. 7629), this chapter describes the relationship between the socioeconomic characteristics of project area residents and neighborhoods and the potential impacts and benefits of the project. Executive Order 12898 requires federal agencies to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately higher adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Impacts and benefits of transportation projects result from the physical placement of such facilities, and also from their ability to improve or impede access among portions of the region. This analysis examines whether ethnic minority and low income populations in the project area would experience these types of impacts.

8.1 ENVIRONMENTAL JUSTICE SETTING

As noted in Chapter 4, Section 4.2, the CalTrain Extension Alternative socio-economic study area comprises four Census Tracts including a variety of neighborhoods and a diverse, multi-ethnic population. This area can be characterized as a mixed use industrial and commercial area, with pockets of dispersed residential development. Population density for the full area is therefore relatively low, but the area has experienced increased levels of residential development in recent years. Between the years 1990 and 1995, it is estimated that the population in the area increased from 7,231 to 11,481, a 59 percent increase. During this period, the number of households grew from 3,441 to 5,266 households.

Approximately 67 percent of area residents are white/Caucasian, which includes individuals of Hispanic origin. This is higher than the citywide average of about 54 percent. On the other hand, over 20 percent of study area residents are black/African American, compared with 11 percent citywide. Approximately 34 percent of all area residents are members of minority groups, which may also include Hispanics, compared with about 46 percent citywide. These groups have been identified by Executive Order 12898 as among those who can experience "disproportionately high and adverse environmental effects."

Auto ownership within the area is slightly less than for the City as a whole (1.1 autos per household compared to 1.3 citywide). This likely reflects the small household size and center-city location of the study area, but it points to a potential for high transit usage, similar to or even greater than that of San Francisco residents generally.

The median income of area households in 1989 ranged from approximately $21,000 (Tract 180) to $41,500 (Tract 179.01). The percentage of residents below the federal poverty level was 12.4 in 1990, approximately the citywide average. In 1990, the percentages of the very young (less than 16 years of age) and elderly (62 or older) were both below the city averages, reflecting the working-age population of the study area.

In summary, the residents of the area include a higher than city average percentage of blacks/ African Americans, with lower than the citywide average percentages of other ethnic groups; and the percentage of below-poverty-level households is lower than the citywide percentage.

8.2 ENVIRONMENTAL JUSTICE IMPACTS

This section reviews the impacts to the minority and low income residents in the project study area associated with the No-Build and CalTrain Extension Alternatives. Both beneficial and adverse effects are discussed.

8.2.1 No-Build Alternative

Under the No-Build Alternative, residents who use automobiles would experience increased levels of congestion and increased travel times. Residents at the eastern (bay) end of the study area who desired to use public transit to employment centers south along the Peninsula (e.g., SFO airport, Silicon Valley) would need to walk or take the Muni light rail extension to a BART station, travel to the airport or Millbrae station, and then transfer to the airport light rail system or CalTrain. Compared to the CalTrain Extension Alternative, one additional transfer would be required to travel to the airport, and two additional transfers would be required to travel to employment centers to the south of the airport (e.g, Silicon Valley) under the No-Build Alternative. These transfers would introduce time and convenience penalties that have been shown throughout the world to discourage transit ridership.

8.2.2 CalTrain Extension Alternative

Consistent with the project purpose stated in Chapter 1, the CalTrain Extension Alternative would improve access to employment, education, medical, and retail centers for residents in the study area. Residents would be able to ride CalTrain with improved travel times, even though congestion on some area roads and freeways would continue to increase. Transit dependent populations could be expected to use CalTrain services for access to various destinations, including employment opportunities along the Peninsula. CalTrain currently is experiencing increases in reverse commuting (southbound in AM and northbound in PM), which likely is due to increasing employment opportunities in the southern portion of the CalTrain service area.

For the Townsend-Center and Townsend-South Side Options, residents at the western end of the study area would have access to a new Mission Bay/Ballpark station located one block west of the current CalTrain terminal. Under the Townsend-South/Subway, these residents would no longer have convenient access to a station in the Fourth/Fifth and Townsend Street area.

The CalTrain Extension Alternative would not adversely affect ethnic and transit dependent communities. In those locations where the extension is near residential areas, the alignment and construction activities occur underground. None of the alignment is elevated.

The construction of a new Mission Bay/Ballpark and terminal stations would be achieved with no displacement and relocation of residents and minimal displacement of businesses. Potential impacts that could be considered environmental justice issues would occur only during the construction phase of the project, and planning has been carried out to define construction techniques and mitigation measures to minimize or eliminate potential adverse impacts. (See Chapters 5 and 6.)

In summary, project benefits -- improved transit service, greater accessibility, and shorter travel times in the future -- would accrue to residents of the CalTrain Extension Alternative study area.

These benefits cannot be achieved without some impacts, particularly during the construction period; but all impacts would be mitigated to the extent feasible, and both the JPB and the FTA believe that project benefits experienced by the CalTrain Extension riders would outweigh the remaining effects.

CHAPTER 9: CEQA FINDINGS OF SIGNIFICANCE

This chapter describes those potential environmental effects identified in Chapters 3, 5, 6, and 7 that would be considered significant under the California Environmental Quality Act (CEQA). Potential cumulative impacts are also described, and the potential for the project to stimulate unplanned growth is considered.

While CEQA requires that a determination of significant impacts be stated in an EIS/EIR, the National Environmental Policy Act (NEPA) does not. Under NEPA, significance is used to determine whether an EIS or some other level of documentation is required, and once a decision to do an EIS is made, the magnitude of the impact is evaluated and no further judgment of its significance is required. For this reason, the CEQA significance criteria and the determination of significant impacts have not been included in every section of this combined NEPA/CEQA EIS/EIR. Instead, those criteria and determinations have been grouped in this chapter, titled "CEQA Findings of Significance."

It should be noted that although the presence of mitigation under CEQA creates a presumption of significant impacts, NEPA anticipates that an EIS will identify means to mitigate the adverse impacts of a project if such measures are not already included in the proposal action or alternatives. For this reason, some mitigations described in this document and in this section are wholly appropriate under NEPA, although the impacts they address may not be considered significant under CEQA.

9.1 SIGNIFICANCE CRITERIA

CEQA requires that an EIR identify the significant environmental effects of the project (CEQA Guidelines Section 15126), but does not provide thresholds for significance. Instead, CEQA Guidelines Section 15064(b) states that "the determination . . . calls for careful judgment on the part of the public agency involved . . . " and that "an ironclad definition of significant effect is not possible because the significance of an activity may vary with the setting." In the current analysis, the Joint Powers Board has given careful consideration to the issue of significance, and to the significance criteria used by local jurisdictions likely to experience effects of the project. As a result, the significance criteria shown in Table 9.1-1 have been used to evaluate the environmental impact categories indicated.

Some impact categories lend themselves to scientific or mathematical analysis, and therefore to quantification. For other impact categories that are more qualitative or are entirely dependent on the immediate setting, a hard-and-fast threshold is not generally feasible. In these cases, the definition of significant effects from the CEQA Guidelines (Section 15382) has been applied as the significance criterion: "a substantial adverse change in physical conditions." Where a potential impact category is not relevant to the current project (potential impact on floodplains is a good example), no significance criterion is presented. Also, unlike NEPA, CEQA does not require a discussion of socioeconomic effects, except where they would result in physical changes, and states that social or economic effects shall not be treated as significant effects (See CEQA Guidelines Sections 15064(f) and 15131). For this reason, socioeconomic impact categories are not included in Table 9.1-1.

Table 9.1-1
CEQA Significance Thresholds
For Selected Environmental Impact Categories

DEIS/ DEIR Sec. No	IMPACT CATEGORY	EXPLANATION OF CEQA SIGNIFICANCE THRESHOLD	SOURCE(S)
5.19 6.3	Transit Services & Accessibility	A significant impact would occur if regional transit accessibility was substantially impaired. No single, quantitative threshold exists.	Derived from State CEQA Guidelines Section 15382
5.19 6.4	Traffic Congestion	A significant impact would occur if the Level of Service (LOS) at any local intersection, ramp, touch-down, arterial or freeway segment would degrade from LOS A, B, C, or D to LOS E or F. (See Sections 1.2 & 3.3.2 for a definition of LOS and a quantification of associated delay. See Chapter 7 for thresholds at local intersections outside of San Francisco.)	City and County of San Francisco convention
5.19 6.4	Traffic Circulation	A significant impact would occur if the project would substantially change traffic circulation patterns, creating an unusual safety hazard, or eliminating access to surrounding areas. No quantitative threshold exists.	Derived from State CEQA Guidelines Section 15382.
5.19 6.5	Parking Displacement	San Francisco has a "transit first" policy, and displacement of automobile parking spaces is not generally considered a significant impact, but more of an inconvenience.	City and County of San Francisco convention
5.1-5.5 6.7-6.10	Land Use, Community Facilities, and Neighborhoods & Businesses	A significant impact would occur if the project would: (a) conflict with established recreational, educational, religious or scientific uses of an area; (b) disrupt or divide the physical arrangement of a community; or conflict with adopted environmental plans and goals of the community. No quantitative threshold exists.	State CEQA Guidelines Appendix G
5.2 6.8	Residential/ Business Displacement	A significant impact would occur if the project would displace a large number of people. No single, quantitative threshold exists.	State CEQA Guidelines, Appendix G

Table 9.1-1, continued
CEQA Significance Thresholds
For Selected Environmental Impact Categories

DEIS/ DEIR Sec. No	IMPACT CATEGORY	EXPLANATION OF CEQA SIGNIFICANCE THRESHOLD	SOURCE(S)
5.16 6.20	Visual Changes	A significant impact would occur if the project would (a) have a substantial, demonstrable negative aesthetic affect; (b) substantially disrupt or degrade a scenic view or vista; or introduce visual elements substantially out of character with existing land uses or visual elements. No quantitative threshold exists.	Derived from State CEQA Guidelines, Appendix G
5.14 6.18	Cultural & Historic Resources	A significant impact would occur if the project would disrupt or adversely affect an archaeological site or a historic architectural resource that has been listed in or determined eligible for the National Register of Historic Places, or would cause a substantial adverse change in the significance of a historical resource listed in or determined eligible for the California Register of Historic Resources. No quantitative threshold exists.	Derived from State CEQA Guidelines, Appendix G, and CEQA Sec. 21084.1.
5.8 6.13	Noise	A significant impact would occur if the project would substantially increase the ambient noise levels for adjoining areas. A noise increase of 10 db is perceived as a doubling of noise, and is generally considered substantial. (See Section 5.8 for a discussion of the FTA Noise Criteria, which determine "impact" and "severe impact" under NEPA).	Derived from State CEQA Guidelines, Appendix G
5.8 6.13	Vibration	A significant impact would occur if the project would create intrusive vibration substantially affecting adjacent land uses. Vibration of 75 VdB is generally considered intrusive for residential land uses. (See Section 5.8 for a discussion of the FTA Vibration Criteria).	Derived from State CEQA Guidelines, Appendix G
5.7 6.12	Air Quality	A significant impact would occur if the project would violate any ambient air quality standard (NAAQS or CAAQS), increase the number or frequency of violations, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations.	State CEQA Guidelines, Appendix G; US EPA; BAAQMD
5.16 6.20	Shadow & Wind	A significant impact would occur if any new structure over 40 feet in height would cause new shading of a park under the jurisdiction of the San Francisco Recreation and Park Department, or if new exceedences of the City's "hazard" criterion for wind (an hourly averaged windspeed of 26 mph) would occur.	City Planning Code of the City and County of San Francisco

Table 9.1-1, continued
CEQA Significance Thresholds
For Selected Environmental Impact Categories

DEIS/ DEIR Sec. No	IMPACT CATEGORY	EXPLANATION OF CEQA SIGNIFICANCE THRESHOLD	SOURCE(S)
5.18 6.22	Energy	A significant impact would occur if the project would encourage activities which result in the use of large amounts of fuel, water or energy; or use fuel, water, or energy in a wasteful manner.	State CEQA Guidelines, Appendix G
5.21 6.24	Temporary Construction Period Effects	Construction impacts on traffic, transit, noise, air quality, and the visual environment would generally not be considered significant since construction-related changes are by their nature temporary. A significant impact would occur only if temporary effects substantially affected accessibility to an area for a long period of time, or posed a severe health or safety threat.	Derived from State CEQA Guidelines, Section 15382
5.15 6.19	Hazardous Materials	A significant impact would occur if the project would create a potential public health hazard involving the use, production, or disposal of materials which pose a hazard to people or animal or plant populations in the area affected. (While quantitative hazardous waste criteria exist for specific materials and constituents, no single, quantitative impact threshold exists.)	Derived from State CEQA Guidelines, Appendix G
5.9 6.14	Geology/ Seismicity	A significant impact would occur if the project would expose people or structures to major geologic hazards. No quantitative impact threshold exists.	State CEQA Guidelines, Appendix G
5.10 6.15	Water Resources	A significant impact would occur if the project would cause substantial flooding, erosion, or siltation, or would substantially degrade water quality, or would substantially degrade or deplete ground water resources. No quantitative impact threshold exists.	State CEQA Guidelines, Appendix G

Source: De Leuw, Cather & Company and other sources as noted, June 1996.

9.2 UNAVOIDABLE SIGNIFICANT ADVERSE EFFECTS UNDER CEQA

Construction of the new underground CalTrain terminal as part of the CalTrain Extension Alternative would require demolition of the Transbay Terminal building and removal of the elevated loop bus ramps which connect the Transbay Terminal to the Bay Bridge. The terminal and the loop ramp are considered contributory elements of the San Francisco-Oakland Bay Bridge, which has been determined eligible for the National Register of Historic Places. In general, projects that result in the substantial alteration or demolition of a recognized historic resource would be considered to have a significant effect on the environment.

As described in Section 5.14, the CalTrain Extension Alternative has the potential to affect archaeological resources that may exist in the project vicinity. Mitigation measures, such as pre-construction testing and/or construction monitoring at selected sites, or data recovery, would be in accordance with an archaeological treatment plan to be developed in conformance with a Memorandum of Agreement to be executed by the JPB, FTA, Caltrans, the Advisory Council on Historic Preservation, and the State Historic Preservation Officer. Based on information available at this time, the project could have a significant adverse effect on archaeological resources.

The CalTrain Extension Alternative would displace and permanently relocate 40 businesses, affecting about 305 employees. In addition, business disruptions could occur during mined tunnel operations and in areas immediately adjacent to cut-and-cover construction. Although the total number of displacements and relocations would be small when considered in the context of the area served by the project, and business and property owners would be compensated for all land acquired and for temporary as well as permanent relocation costs, the individuals and businesses involved may perceive their displacement and relocation as a significant unavoidable adverse effect.

In general, CEQA does not require an analysis of socioeconomic effects, and temporary business disruptions would not be considered significant under CEQA.

9.3 CUMULATIVE EFFECTS

CEQA defines cumulative impacts as "two or more individual effects which, when considered together are considerable," and suggests that cumulative impacts may "result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355). CEQA documents are required to include a discussion of potential cumulative effects *when those effects are significant* and the State CEQA Guidelines suggest two possible methods for assessing potential cumulative effects (State CEQA Guidelines Section 15130). The first method is a list-based approach, which considers a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts. The second method is projections-based, and uses a summary of projections contained in an adopted general plan or related planning document which is designed to evaluate regional or areawide conditions. The projections-based method is generally used by San Francisco in evaluating projects within its jurisdiction.

While the use of regional projections is one possible method of analyzing cumulative effects under CEQA, it is the required method under NEPA. FTA guidelines require that regional growth projections from the metropolitan planning organization (MTC in this case) be used as input for the assumed future year conditions. In the current document, transportation projections for the study area were estimated using MTC's travel demand forecasting model, which was originally prepared for the 1994 Regional Transportation Plan (RTP), together with manual adjustments based on outputs from the San Mateo Countywide model. Inputs to the MTC model include Association of Bay Area Governments (ABAG) projections of future land use and employment intensities and locations throughout the region. Also input were programmed highway, street, and transit improvements as identified by MTC and the Joint Powers Board for the year 2010. Assumed improvements included the Muni Metro Extension, and the extension of BART to the San Francisco airport, as well as other projects contained in MTC's 1994 RTP.[1]

Within San Francisco, adjustments made to ABAG's land use projections by the San Francisco Planning Department for the Draft EIS/EIR regarding Alternatives to Replacement of the Embarcadero Freeway and the Terminal Separator Structure were incorporated in order to ensure consistency with that earlier study. The adjustments assume reasonable development of sites made vacant by removal of ramps associated with the Embarcadero Freeway and the Terminal Separator Structure.

9.3.1 Regional Context

Because this document is based on accepted, regional land use forecasts for 2010, and assumes transportation improvements programmed within the same time frame, effects evaluated with the project include the cumulative effects of development within the region. Thus, additional analysis of potential cumulative effects related to specific development and transportation improvement projects within the region is not necessary. Impact categories for which the project effects presented in Chapters 3, 5, 6, and 7 already present cumulative conditions include the following: land use, transportation (including traffic and transit), air quality, and noise.

Regionwide cumulative effects in other impact categories would be those identified by the EIR for the MTC's 1994 RTP, which identified unavoidable significant impacts in 10 impact categories, including air quality, energy, geology and seismicity, water resources, biological resources, visual resources, noise, transportation, social environment, and land use. After mitigation, the current project would either not contribute or would make a negligible contribution to identified regionwide cumulative significant effects, which are expected to occur in the future whether or not the current project is adopted and constructed.[2]

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[1] Korve Engineering, *CalTrain Ridership forecasting Results* Report, May 1996, Chapter 1.

[2] Metropolitan Transportation Commission, *1994 Regional Transportation Plan Final Environmental Impact Report*, June 1994.

9.3.2 Local Context

Potential cumulative effects are not always regional in scope, and the current project was analyzed to determine whether less than significant environmental effects that would be experienced locally could become significant when considered with other reasonably foreseeable future projects in the project area. Reasonably foreseeable future projects are here defined as the projects assumed in the 2010 No-Build Alternative and described in Section 2.2, plus potential future development projects that have been approved or are currently being reviewed by the City.

Again, project-related land use, transportation, air quality, and noise reported in Chapters 3, 5, 6, and 7 would be the same as cumulative conditions because the analyses assumed planned future land use and transportation facilities.[3]

Construction of other planned projects in the general vicinity of the CalTrain Extension Alternative may involve temporary traffic disruptions, including lane closures and detours, construction-related noise and air quality effects, and permanent changes to the visual environment and neighborhood character. Similar effects of the CalTrain Extension Project would be temporary or, in the case of permanent visual changes, would not be considered significant. These impacts of the CalTrain Extension Project would also not result in significant cumulative effects with the impacts identified in local planning documents or environmental studies.

9.4 GROWTH INDUCEMENT

This section considers whether the CalTrain Extension to the Transbay Terminal Site Alternative would encourage development in excess of amounts expected and provided for in the region and/or San Francisco. Growth inducement would occur if the amount of population or employment growth projected to occur under the Build Alternative would exceed planned levels. Increased development and growth in an area are dependent on a variety of factors, including employment and other opportunities, availability of developable land, and availability of infrastructure, water, and power resources.

Transportation projects are potentially growth inducing when they extend service to the edge of an urban area, reducing travel times and improving access between employment opportunities and vacant or underdeveloped land to the extent that the travel time savings and enhanced accessibility outweigh other factors affecting locational decisions. Transit travel times with the CalTrain Extension Alternative are projected to decrease by as much as 17 minutes. These time savings, while sufficient to attract additional riders to CalTrain, are not expected to induce unwanted or unplanned growth, both because they are not great enough to offset other locational factors, and because the project would extend an existing rail corridor, within a region that is already developed.

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[3] Potential non-peak traffic generated by the proposed baseball stadium at China Basin and the proposed retail-entertainment center on Rincon Hill have not been considered in detail. Environmental documents currently being prepared for both facilities will be required to analyze trip generation, peaking characteristics, and other effects in detail.

Modest growth is expected in the region by 2010, and San Francisco population is expected to grow approximately 10 percent from about 723,960 in 1990 to 800,600 by 2010. At the same time, jobs are expected to grow about 16% from about 566,648 in 1990 to about 655,722 in 2010, with some shift in downtown jobs to the South of Market area. The primary factors causing the magnitude of this growth, such as the regional economy, availability of services, and so on, are independent of the proposed project.

Within downtown San Francisco, the CalTrain Extension could potentially open up some State-owned sites for future development by removing the existing Transbay Terminal and associated ramps. Also, the proposed CalTrain and bus terminal would provide a hub, bringing a large, transit-user population into a confined area, focussing opportunities for economic/joint development on the site, and potentially stimulating economic activity in the general vicinity. In describing a new Main/Beale bus terminal, the CalTrain terminal would be constructed so that development could occur above it, and some have envisioned joint development on the site, in concert with construction of a new bus facility. *The Transbay Area Plan Issues and Opportunities* report prepared by the San Francisco Planning Department, identifies key opportunities, including "the opportunity to incorporate retail and other uses that integrate the [bus] terminal with the surrounding area..."[4]

In the context of downtown San Francisco, opportunities created by the CalTrain Extension to the Transbay Terminal site and in the vicinity would not be expected to stimulate unplanned growth, but would rather facilitate the distribution of projected growth to available sites, and facilitate development activities consistent with the *San Francisco General Plan*. Several reasons support this conclusion: first there is abundant, vacant State-owned land in the area, made available by removal of the Embarcadero Freeway and Terminal Separator ramps; there is also a substantial quantity of underdeveloped land currently available along the waterfront and in the Mission Bay area. Second, there are numerous approved but unbuilt office projects in downtown San Francisco which can be expected to proceed to construction in advance of more speculative commercial development projects should the commercial real estate market continue its rebound from the recent recession. Finally, real estate values in downtown San Francisco have historically been among the highest in the region, and downtown sites will continue to face stiff competition to attain for a percentage of the region's employment and population growth.

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[4] San Francisco Planning Department, *Transbay Area Plan Issues and Opportunities*, May 1996 Preliminary Draft, p. 64.

9.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The No-Build Alternative would not directly involve the use of resources, except insofar as it assumes implementation of planned and programmed capital improvements, which require money, materials, and labor to construct. The CalTrain Extension Alternative would include capital improvements, which would require money, materials, and labor, for a total cost of about $526 to $671 million, excluding replacement of the bus terminal.

Because the CalTrain Extension Alternative would reduce vehicle miles traveled within the region when compared to the No-Build Alternative, it would also reduce the level of vehicular fossil fuel consumption. Further reductions would occur with the full system electrification propulsion option. Reductions could also occur because local transit operators (Muni and SamTrans) would no longer have to serve the Fourth and Townsend Street terminal.

Operation of trains on the 1.3-mile extension would require the use of electricity for power, and would have greater propulsion energy requirements than the No-Build Alternative, although the energy requirements per passenger trip would be similar or less.

9.6 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The CalTrain Extension to the Transbay Terminal Site Alternative would involve short-term uses of the environment during the construction period through the use of fuel and construction materials, through increases in noise levels and air pollutants, and through increases in traffic congestion and detours around construction sites. These short-term effects and uses of resources would result in long-term benefits such as improved access to downtown San Francisco from the Peninsula. Improved access, when combined with the decrease in vehicle miles of travel on the regional highway network, improved air quality, and reduced energy consumption, would contribute to the long-term livability, and therefore productivity, of the region.

CHAPTER 10: COORDINATION AND CONSULTATION

This environmental document was prepared on the basis of coordination and consultation with various federal, state, and local agencies, and with elected officials, community leaders, organizations, and other individuals from the neighborhoods and communities within San Francisco and the Peninsula CalTrain Corridor. Coordination and consultation were achieved through a variety of means, including workshops, informational meetings, individual/group contact and mailings. Public hearings will be held during the circulation period for this environmental document.

10.1 PUBLIC INVOLVEMENT AND INFORMATION PROGRAM

The Public Involvement and Information Program (Program) integrated two "tracks" of activities: Public Involvement and Public Information. Public Involvement activities provided opportunities for the public to express issues of concern that helped guide the development of alternatives, selection of the most appropriate design options, and the preparation of environmental documents; and to review potential project impacts (environment, economic development, traffic flow, transit operations, etc.) being evaluated by the JPB. Public Information activities enabled the public (citizens and agencies alike) to learn about project issues and the environmental study and planning process.

10.1.1 Objectives

The Program was designed to achieve the following objectives:

- Obtain community and agency input on plans for alignments, design options, and other features of the extension alternatives;
- Gather input and feedback from the community and all interested and responsible agencies about potential environmental and economic impacts of the proposed extension and station elements and design alternatives;
- Build and maintain support for the preferred plan throughout the design and planning process;
- Inform the public, the local community, and all interested and responsible agencies at each major milestone in the engineering and environmental study and development process for the proposed CalTrain Downtown Extension Project; and
- Educate the public about the CalTrain system goals and objectives.

10.1.2 Public Involvement

Opportunities for public input and feedback on planning and design issues began early and continued throughout the project. These activities included: key stakeholder interviews (over 40); community workshops (three rounds); and informational meetings (two).

Key Stakeholder Interviews

Over forty (40) one-on-one interviews with community leaders, elected officials, agency representatives, business and property owners, and residents were conducted during project initiation. The purpose of these interviews was to provide an opportunity for respondents to voice their opinions and concerns related to the project early in the planning process, and to allow for early identification of key issues. The names of key stakeholders are included in the list in Section 10.6.1.

Community Workshops (three rounds)

Community workshops were held in June 1995, October 1995, and March 1996. The purpose of the workshop series was to provide the San Francisco and Peninsula communities with an opportunity to express opinions and concerns related to the project early and throughout the planning process. Information gathered during each workshop helped guide the development and refinement of alternatives and options.

Workshop #1: Project Reinitiation, Preliminary Alternatives
    June 21, 1995 (San Francisco)
    June 29, 1995 (Peninsula -- San Carlos)

Workshop #2: Response to Community Input, Revised Alternatives, Eight Key Decisions
    October 11, 1995 (Peninsula -- San Carlos)
    October 19, 1995 (San Francisco)

Workshop #3: Review of Eight Key Decisions Made by JPB
    March 4, 1996 (San Francisco)
    March 12, 1996 (Peninsula -- San Jose)
    March 13, 1996 (Peninsula -- San Carlos)

Public Informational Meetings

During the course of the project, two areas of interest emerged regarding mitigation measures for demolition of the Transbay Terminal bus facility: the effect of the project on transit operations and the possibilities for joint development. Although not entirely within the scope of the environmental document, two informational meetings were held in May 1996 to provide additional opportunity for interested parties to further explore these issues.

10.1.3 Public Information

The public information activities enabled the public to become better informed and educated about project issues and the environmental study and planning process. To maximize contact with people and parties who might be interested or have a stake in project outcomes, the following outreach methods were used: Mailing List; Hotline; Area Canvassing; Newsletter Series; Media Relations and Publicity Packages; and "City at the Crossroads" Brochure.

Mailing List

The project mailing list served as a central distribution point for mailing project-related information materials to an interested audience. The list ensured that all newsletters and other materials were made available to community members, businesses, local media, and relevant government agencies.

At project outset, existing database sources were compiled to form the project mailing list. Initially, there were approximately 1,000 entries. Following the canvassing effort (described below) and first round of workshops (described above), the number of entries increased to approximately 2,500. During the project, the list has been updated regularly and currently contains approximately 3,500 entries.

Hotline

A project hotline was established at the end of May 1995 to maximize response to information requests from individuals and to announce upcoming public involvement opportunities. Calls are answered during business days, and, at other times, are recorded using a voice mail system. The voice mail system is accessible to people speaking English, Cantonese, and Spanish. Hotline activity from May 1995 through June 1996 was as follow:

- Total calls: 187
- Comments/Questions: 36
- Requests for additional materials or mailing list changes/additions: 120
- Press calls: 10

Area Canvassing

A canvassing effort was undertaken for the affected area during project initiation. The purpose was to distribute initial project literature, expand the project mailing list, and encourage attendance at public workshops. This personal contact helped to demonstrate commitment to early community involvement.

To involve as many people as possible, a team of outreach workers was assembled who covered the area in four days. Canvassers personally contacted 701 people and left approximately 650 newsletters for residents or business owners who were not available for direct contact. Internal communications to occupants of controlled-access buildings, such as flyer distribution or in-house newsletter articles, reached approximately 1,400 additional residents and businesses.

Newsletter Series

A project newsletter series was established to stimulate interest among stakeholders, educate the community on issues being addressed in the project, encourage widespread community participation and awareness, and announce upcoming events.

- Issue #1–May 1995. The first issue provided a brief overview of the project history and purpose, and the goals and priorities of the JPB; presented maps of preliminary alternative alignments; described the planning and environmental process; and outlined public involvement opportunities, including an announcement of the first round of community workshops.

- Issue #2–August 1995. The second issue reported the JPB's revision of several aspects of the proposed extension in direct response to public input; described the results from initial public participation activities; provided detailed explanations and map illustrations of the remaining three alternatives; and announced the second round of workshops to be held in October 1995.

- Issue #3–October 1995. The third issue reported on project progress and the JPB's next steps in detailing the two "build" alternatives, known as the CalTrain Extension to a New Station at Market/Beale Streets and the CalTrain Extension to a New Station at the Transbay Terminal Site. The issue called for the public's assistance in reviewing and selecting specific design options for the two alternatives based on eight key decisions, which were fully explained and illustrated.

- Issue #4–February 1996. This issue reported on the JPB's selection of the CalTrain Extension Alternative to the Transbay Terminal Site as the preferred alternative based on technical information and community input. The issue also described in detail the results of the eight key decisions that led to the selection of this alternative.

- Issue #5–April 1996. This issue described three alternative mitigation measures for replacing the existing Transbay Terminal. This issue also provided background information on transit operations and joint development potential as a discussion framework for public informational meetings to be held in May 1996.

- Issue #6--March 1997. This issue provides an overview of the project and the public's role to date in the environmental review process. Other articles review project financing and tunneling techniques. The issue also includes a fold-out illustrating the five key decisions that will lead to selection of the locally preferred alternative.

Media Relations and Publicity Packages

Media relations and publicity packages were distributed to the local media to advertise and announce participation opportunities. Each package included a newspaper advertisement for upcoming meetings and a press release. When appropriate, a flyer was developed and distributed on the trains and at key stations.

"City at the Crossroads" Brochure

The 16-page, color "City at the Crossroads" brochure was a joint publication of the JPB and the City of San Francisco that featured generalized visual perspectives of various design options for two "build" alternatives: Extension to the Transbay Site and Extension to the Main/Beale Site. One thousand brochures were distributed to key decision-makers and elected officials in the Fall of 1995 and into 1996.

10.1.4 Screening the Alternatives - The Eight Key Issues and Decisions

During the project development phase of the study, a number of issues and decisions of key importance to the community emerged. To help facilitate agency and community review and input, the JPB organized these issues into key planning and design decisions to enable screening of alternative options and withdrawal of non-viable components. These were identified as the "eight decisions". A September 1995 Design Options Screening Report, summarizing critical information pertaining to these eight decisions, was provided to citizens, agencies, and decision makers for use during their deliberations. Newsletter Issue #3 summarized the design options screening information for the general public.

Public, Agency, and Commission Actions Regarding Eight Issues

Public workshops held during October 1995 presented and provided for discussion of the screening issues. In addition, a number of committees, agencies, boards, and commissions took actions regarding the eight decisions, as follows:

- Recommendations from the San Mateo County Transportation Authority Citizens' Advisory Committee and the CalTrain Citizens' Advisory Committee were generally consistent with the decisions made by the JPB.

- The Rincon-South Beach Redevelopment Area Citizens' Advisory Committee passed a resolution (1) opposing operation of trains on any surface street; (2) recommending use of boring/tunneling throughout as opposed to cut-and-cover construction; (3) recommending full electrification of the system; and (4) recommending against any excavations on The Embarcadero or King Street.

- The San Francisco Board of Supervisors and three commissions (City Planning, Redevelopment, and Public Transportation) considered the CalTrain Extension as part of an effort to select a preferred alternative for locating a new regional bus terminal in the Transbay Terminal area. The three commissions passed resolutions endorsing the location of the CalTrain station underground on the Transbay Terminal site and recommending that a new regional bus terminal be located on a site bounded by Beale and Main Streets generally between Folsom and Mission Streets. The Public Transportation Commission's resolution included a recommendation that the JPB give special consideration to ways to minimize potential construction and alignment impacts from the extension.

- The San Francisco Board of Supervisors held a joint meeting of the Housing and Land-Use Committee and the Budget Committee to hear presentations on the City's Bus Terminal Study and JPB's CalTrain Extension Study on February 15, 1996. Following public testimony, the joint committee passed a resolution *"indicating the Board of Supervisors preference for the Main and Beale Streets at Howard Street site as the location for a replacement bus facility to the Transbay transit terminal and indicating the Boards preference for an underground CalTrain Terminal extension at the current Transbay Terminal Site and urging the mayor to take those steps necessary, with Caltrans, the Metropolitan Transportation Commission, and other parties as appropriate, to initiate project planning activities for a replacement transit terminal at the Main and Beale location..."*.

JPB Resolutions on Screening the Alternatives

As a result of the engineering and environmental studies undertaken to that point and in consideration of the agency and commission recommendations and public comments received, the JPB passed the following resolutions with regard to the alternative options:

- In January 1996, the JPB selected Townsend Street as the east-west alignment for this segment of the proposed extension. Rather than selecting one specific portal location, the JPB asked staff to evaluate three alignment/portal options. Two of these options would allow construction of an at-grade Mission Bay Station to serve the area and the proposed Giants ball park.

- In January 1996, the JPB dropped the Market/Beale Station alternative from further consideration, citing technical problems, potential significant environmental impacts on the South Beach neighborhood, and higher costs. In dropping the Market/Beale site, the JPB selected the Transbay Terminal Site Station as the preferred "build" alternative for the proposed project.

- In January 1996, the JPB directed staff to study three mined tunnel alignments through the South Beach Area: short radius, medium radius, and long radius curves.

- In January 1996, the JPB decided to pursue an underground station at the Transbay Terminal Site based on several advantages over an aerial structure:

  — An underground CalTrain station would improve the feasibility of underground construction through Rincon Hill. This construction would be deeper than that for the aerial option and would not interfere with Caltrans' seismic replacement of the Bay Bridge approach and ramps.

  — Unlike the aerial station, the underground alignment would not require the permanent closure of Clementina and Tehama Streets.

  — The underground station would better accommodate a six-track CalTrain terminal. Under the aerial station option, such a structure would extend 12 to 20 feet over Natoma Street.

  — Civic groups and property owners had expressed concern about the visual barriers and noise that new aerial train ramps could create in their neighborhood.

- In March 1996, the San Francisco Board of Supervisors indicated its preference for this alternative. Summary reasons for this stated preference include:

  1) minimal disruption to AC Transit, Greyhound and other operators by keeping the existing Transbay Terminal operating during construction of the Main/Beale Terminal;

  2) excellent connections to CalTrain without requiring that CalTrain be built prior to the construction of the bus terminal;

  3) surface bus operations are away from congestion on First and Fremont Streets, increasing operational efficiency and schedule reliability;

  4) minimal view blockage and other urban design impacts of the ramps by paralleling the Fremont auto ramp, essentially adding only additional blockage of Fremont and Beale Streets;

5) finally, the removal of the impediment to development that the existing terminal and a new above-ground terminal at the transbay site poses.

Since extending CalTrain to this location would require demolishing the Transbay Terminal, four bus terminal replacement options are evaluated in this CalTrain DEIS/DEIR as mitigation measures for tearing down the existing terminal.

10.2 AGENCY CONSULTATION

Public agencies formally or informally contacted and consulted during the preparation of this environmental document, including those which received notice or a copy of this DEIS/DEIR, are listed below.

- State Historic Preservation Office
- San Francisco Municipal Railway
- Metropolitan Transportation Commission
- Caltrans, District 4
- San Mateo County Transportation Authority
- San Francisco Planning Department
- San Francisco Redevelopment Agency
- AC Transit
- Santa Clara County
- Santa Clara Valley Transportation Agency
- City of Foster City
- City of Atherton
- San Mateo County
- City of Burlingame
- City of Palo Alto
- City of Brisbane

10.3 NOTICE OF INTENT/NOTICE OF PREPARATION

In January 1989, a Notice of Intent (NOI) to prepare an Environmental Impact Statement and a Notice of Preparation (NOP) to prepare an Environmental Impact Report were published. Public scoping meetings were held, a scoping report was prepared, and after an Administrative Draft EIS/EIR was prepared, the project was put on hold due to lack of funding commitments. The project resumed with the republication of NOI and NOP in May 1995, which initiated the public involvement and information program discussed above.

10.4 REQUIRED PERMITS AND APPROVALS

Permits and approvals involving other local, state, and federal agencies will be required prior to project implementation. A list of these major approvals is provided in Table 10.4-1, below.

Table 10.4-1
Agency Approvals

Agency	Approval or Permit
Advisory Council on Historic Preservation	Approval of Memorandum of Agreement (MOA) describing procedures for protection of and mitigation of impacts to historic and cultural resources pursuant to Section 106 of the National Historic Preservation Act and 36 CFR 800.
State Water Resources Control Board	General Construction Activity Stormwater Permit.
California Public Utilities Commission	Permits required for all at-grade railroad crossings and public safety considerations of underground CalTrain Extension and Terminal.
San Francisco Bureau of Environmental Health	Permit required for drilling or other subsurface exploration.
San Francisco Planning Department	General Plan Review/Referral for all aspects of project which occur in public rights-of-way, and amendments to appropriate portions of General Plan, such as Mission Bay Plan, Transportation Element, etc.
San Francisco Department of Public Works	Approval required for construction in streets. Batch Industrial Wastewater Discharge Permit required for de-watering effluent discharge to the combined sewer system providing the quality of the effluent meets the NPDES General Permit discharge standards. Article 20 of San Francisco Municipal Code requires preparation of a Site Mitigation Plan if soil sampling and analysis indicate presence of hazardous waste in soil subject to construction disturbance.
San Francisco Parking and Traffic Commission	Approval required for surface street changes, traffic operation changes, traffic control measures, and on-street parking changes.
San Francisco Public Transportation Commission	Approval required for municipal public transit realignments.
San Francisco Redevelopment Agency	Project review required for portions within the Rincon Point- South Beach Redevelopment Area.

10.5 TECHNICAL ADVISORY COMMITTEE

A Technical Advisory Committee comprising representatives of key planning agencies, transit operators, Caltrans, and others, was consulted throughout the studies. Its members are as follows:

- Carmen Clark, San Francisco Transportation Authority
- Larry Badiner, San Francisco Planning Department
- Charles Rivasplata, San Francisco Planning Department
- Bill Wycko, San Francisco Planning Department
- Peter Strauss, San Francisco Municipal Railway
- Bill Carney, San Francisco Redevelopment Agency
- Gail Goldman, San Francisco Redevelopment Agency
- Steve Fisher, Santa Clara County Transportation Authority
- Doug Kimsey, Metropolitan Transportation Commission
- Bob Hom, Federal Transit Administration
- Paul Bignardi, Alameda County Transit
- Paul Keener, Alameda County Transit
- Maurice Palumbo, Golden Gate Transit
- Alan Zaradnik, Golden Gate Transit
- Dave Adams, Gannett Fleming
- Roger Milroy, Gannett Fleming
- Nancy Knofler, Caltrans, District 4
- Carol Streeta, Caltrans, District 4
- Lisa Ives, Peninsula Corridor Joint Powers Board
- Howard Goode, Peninsula Corridor Joint Powers Board
- Andrew Nash, Peninsula Corridor Joint Powers Board
- Jerry Kirzner, Peninsula Corridor Joint Powers Board
- Marie Pang, Peninsula Corridor Joint Powers Board
- Walt Stringer, Peninsula Corridor Joint Powers Board
- Dave Minister, ICF Kaiser
- Dave Mansen, De Leuw, Cather & Company

10.6 PERSONS AND ORGANIZATIONS CONSULTED

A list of private groups and individuals contacted and consulted during preparation of this environmental document, including those which/who received a notice or copy of the DEIS/DEIR, is provided below.

10.6.1 Individuals

One-on-one interviews with community leaders, elected officials, agency representatives, business and property owners, and residents were conducted during project initiation in May and June

1995. Other individuals were consulted during preparation of the environmental document. Following is a list of all persons interviewed/consulted and their affiliations.

- Phil Adams, General Manager, San Francisco Municipal Railway Joint Powers Board
- Larry Appriano, Engineer, Caltrans Right-of-Way/Airspace Division
- Lawrence B. Badiner, Senior Planner, San Francisco Planning Department
- Jack Bair, Director of Governmental Affairs, San Francisco Giants
- Jane Baker, Metropolitan Transportation Commission
- Kevin Beatty, Southwest Research Institute (LNG and Clean Diesel Locomotives)
- John Billovitz, Associate Environmental Planner, City of San Francisco
- Charles Birnbaum, National Park Service, Preservation Assistance Program
- Bill Bodrick, Bechtel Corporation
- Dr. Tor L. Brekke, Tor L. Brekke, Inc. (Tunneling Expert)
- Chris Brittle, Metropolitan Transportation Commission
- Willie Brown, Mayor of San Francisco
- Joe Browne, Director, Caltrans, District 4
- Peter Bucato, San Francisco Water Department
- Gary Burke, President, Santa Clara Valley Manufacturing Group
- Mike Caleb, Engineering Supervisor, Viacom/S.F.
- Bill Carney, Project Manager, San Francisco Redevelopment Agency
- Steve Carpenter, Electric Transmission Engineer, Pacific Gas and Electric Company
- Jeff Carter, Member, Train Riders Association of California (Longtime CalTrain Rider)
- Matt Caselli, Industrial Power Engineer, Service Planning, Pacific Gas and Electric Company
- Ed Chan, Map Draftsman, Pacific Gas and Electric Company
- Roger Chinn, Foster City Council Member, San Mateo Transportation Authority
- Richard E. Condon, Fire Marshal, San Francisco Fire Department
- Jim Cordoba, Air Quality Meteorologist, Bay Area Air Quality Management District
- Joann Cullom, Caltrans, District 4, Environmental Planning
- Larry Dahms, Executive Director, Metropolitan Transportation Commission
- Keith Delaway, Traffic Engineer, City of Burlingame
- Rod Diridon, Executive Director, International Institute for Surface Transportation Policy Studies
- Gary Donelan, Engineering Administrator, Pacific Bell
- Malcolm Dudley, Atherton City Council member, San Mateo Transportation Authority
- John Elberling, Executive Vice President, Tenants and Owners Development Company
- John S. Fallowfield, Manager Maintenance of Equipment, Peninsula Commute Service
- Chris Fernandez, Engineer, City of Santa Clara
- Steve Ferrari, Chair, CalTrain Citizens' Advisory Committee
- Frank Forcione, Manager Commuter Operations, Peninsula Commute Service
- David Forgash, Liquid Carbonic (LNG for Locomotives)
- Paul F. Gately, Manager of Operations, Peninsula Commute Service
- Donald Gilbert, Engineering Technician, Railroad Passenger, City of San Carlos

- Tony Godkin, Caltrans - Airspace Development
- Gail B. Goldman, Project Manager, San Francisco Redevelopment Agency
- Jeffrey J. Greene, Customer Service Manager, Greyhound Lines, Inc.
- Mary Griffin, San Mateo County Supervisor, San Mateo Transportation Authority, Metropolitan Transportation Authority
- Robert Gross, Archeologist, Caltrans, District 4
- Carl Guardino, Vice President, Santa Clara Valley Manufacturing Group
- Harry Gulbengay, San Francisco Department of Public Works
- Jim Haas, Trans-Bay Area Citizens' Advisory Committee
- Russ Hancock, Vice President, Bay Area Council
- Thomas E. Harvey, Captain, Bureau of Fire Prevention
- Susan Hestor, Attorney
- Henry Hilken, Senior Environmental Planner, Bay Area Air Quality Management District
- Lisa Hooten, Mission Bay Asst. Manager, Catellus Corporation
- Tom Hsieh, San Francisco Supervisor, Joint Powers Board, Metropolitan Transportation Authority
- Tom Huening, San Mateo County Supervisor, SamTrans, San Mateo Transportation Authority
- Tome Huertes, City Engineer (Outside Plant Construction), MCI Telecommunications
- Ann Huston, National Park Service, Pacific Great Basin Support System Support Office
- Darton Ito, Planner, SamTrans/Joint Powers Board, San Mateo County Transit District
- Lisa Ives, Senior Planner, SamTrans/Joint Powers Board, San Mateo County Transit District
- Paul and Scott Jensen, Energy Conversions, Inc. (Clean Diesel Locomotives)
- Bob Jew, Project Manager, San Francisco Fire Department
- Frank Jordan, Former Mayor of San Francisco
- Leigh Jordan, Coordinator, Sonoma State University
- Michael Kiesling, Regional Alliance For Transit
- Marty Knight, Mayor of Burlingame
- Leo Ladner, Engineer, Pacific Bell
- Robert Langford, Project Manager, Muni Metro Turnback
- Sam Lauter, Communit Relations, Pacific Gas & Electric
- Barbara Lee, Tax Advisor, State Board of Equalization
- Chester Livingston, Corporate Account Representative, Pacific Gas and Electric Company
- Art Lloyd, SamTrans, Joint Powers Board Member
- Kerstin Magary, Project Director, Catellus Development Corporation
- Clark Manus, Chair, San Francisco Transbay Study
- Rick Mariano, Rincon-South Beach Citizens' Advisory Committee
- Jean McCown, Palo Alto Council member, Joint Powers Board
- Elizabeth McKee, Caltrans District 4 Environment Branch
- Dianne McKenna, Santa Clara County Supervisor
- Dan McNamara, President, Train Riders Association of California

- Ronald Metsurs, Senior Engineer, City of San Mateo, Public Works Department
- Tom Medina, Senior Map Draftsman, Pacific Gas and Electric Company
- Raymond Miller, Mayor of Brisbane
- Mark Minor, Statistics Section, State Board of Equalization
- David Moore, Engineer Associate, San Francisco Fire Department
- Mr. Norman A. Nadel, Nadel Associates, Inc. (Tunneling Contractor)
- Michael Nevin, San Mateo County Supervisor
- Tom Nolan, Former San Mateo County Supervisor
- Dr. Thomas D. O'Rourke, Professor of Civil and Environmental Engineering, Cornell University (Tunneling Expert)
- Rita Odum, Property Tax Division, State Board of Equalization
- Jay Oren, Architect, City of Los Angeles
- Don Parker, Vice President for Development Bay Area, Catellus Development Corporation
- Joe Pelayo, Senior Civil Engineer (Section Chief), San Francisco Water Department
- Walter Perez, Communications Engineer, AT&T
- Gary Pope, Liquid Carbonic (LNG for Locomotives)
- Mary Praetzellis, Historian, Sonoma State University
- Ken Rafanan, Traffic Technician, City of Menlo Park
- Teresa Rea, Golden State Warriors Representative
- Norman Rolfe, San Francisco Tomorrow
- Ron Rothacker, Manager, Technical Support Division, California Air Resources Board
- Barbara Sahm, Office of Environmental Review, San Francisco Planning Department
- D. L. Saunders, Superintendent Commuter Operations, Peninsula Commute Service,
- Mike Schonherr, Building and Land Services, Pacific Gas & Electric Company
- Dr. S. M. Shahed, Southwest Research Institute (LNG and Clean Diesel Locomotives)
- Angelo Siracusa, President, Bay Area Council
- Jack Smith, Southwest Research Institute (LNG and Clean Diesel Locomotives)
- Scott Steinwert, Public Relations, Public Affairs Management
- Carl Stoffel, Transportation Engineer, City of Palo Alto, Department of Planning & Community
- Lynn M. Suter, Legislative Advocate, Lynn M. Suter and Associates
- Dave Sutter, Project Manager, San Francisco Public Transportation Commission
- Paul J. Tabacco, Battalion Chief, San Francisco Fire Department
- Al Teglia, Daly City Council member, Joint Powers Board
- Paul J. Tennant, Director of Real Estate, Greyhound Lines, Inc.
- Jerry Tone, Executive Vice President, Montgomery Capital Corporation
- Edgar Ugarte, Program Manager, San Mateo County Transportation Authority
- Sidney Unobskey, former President, San Francisco Planning Commission
- John Vandemosh, University of Texas, Construction Industry Institute
- Ron West, Metropolitan Transportation Commission
- Jim Wheeler, Chair, San Mateo Transportation Authority Citizens' Advisory Committee
- Jack Whithouse, Planner, City of Sunnyvale

- Mary Wiese, Building Manager, Pacific Gateway Building
- Matt Williams, Director, AC Transit
- Bruce Wilson, Broker, Galbreath Realty, Inc.
- Doug Wright, Transportation Consultant
- Bill Wycko, Transportation Manager, San Francisco Planning Department
- Eric Yopes, Executive Vice President, The Shorenstein Company

10.6.2 Committees

- CalTrain Citizens' Advisory Committee
- Transbay Area Citizens' Advisory Committee
- Rincon-South Beach Citizens' Advisory Committee
- San Mateo Transportation Authority Citizens' Advisory Committee
- SamTrans Citizens' Advisory Committee

10.6.3 Groups and Associations

- Santa Clara Valley Manufacturing Group
- International Institute for Surface Transportation Policy Studies
- Tenants and Owners Development Company
- Regional Alliance for Transit
- Train Riders Association of California (TRAC)
- Bay Area Council
- San Mateo County League of Women Voters

10.6.4 Other Interested Parties

- San Francisco Giants
- Bechtel Corporation
- Pacific Gas & Electric
- San Francisco Transbay Study
- Catellus Development Corporation
- Golden State Warriors
- Montgomery Capital Corporation
- Pacific Gateway Building
- The Shorenstein Company
- KSW Properties

10.7 CHRONOLOGY OF COORDINATION

Below is a chronological list of the activities which took place during the Public Involvement and Information Program:

- Project Newsletter Issue #1—May 1995
- Project Area Canvassing—May 1995
- Project Hotline—Established May 26, 1995
- Key Stakeholder Interviews—May and June 1995
- Round One of Community Workshops—June 1995
- Project Newsletter Issue #2—August 1995
- "City at the Crossroads" Brochure—Fall 1995
- Project Newsletter Issue #3—October 1995
- Round Two of Community Workshops—October 1995
- Project Newsletter Issue #4—February 1996
- Round Three of Community Workshops—March 1996
- Project Newsletter Issue #5—April 1996
- Transit Operations Public Informational Meeting—May 1996
- Joint Development Public Informational Meeting—May 1996
- Project Newsletter Issue #6—March 1997
- Public Hearing—Anticipated in April 1997

CHAPTER 11: DRAFT 4(f) EVALUATION

11.1 INTRODUCTION

This discussion complies with the federal requirements found in 49 USC, Section 303 and 23 USC, Section 138, commonly referred to as Section 4(f). These requirements pertain to all actions or projects undertaken by agencies within the U.S. Department of Transportation, including the Federal Transit Administration (FTA). The essence of 4(f) requirements is that special efforts are to be made to protect public park and recreation lands, wildlife and waterfowl refuges, and historic sites. The law states that the Secretary of Transportation shall approve a project which requires the **use** of land from a significant publically-owned park, recreation area, wildlife or waterfowl refuge, or historic site of significance ONLY if (1) there is no prudent and feasible alternative to the use of that land and (2) the project includes all possible planning to minimize harm to the resource being affected by that use.

As defined under Section 4(f), **use** occurs when protected land is permanently acquired for a transportation facility, when a temporary use is considered adverse, or when there is "constructive use" of the resource. Constructive use occurs when indirect impacts are so severe that the activities, features, or attributes that qualify the resource for protection are substantially impaired.

Pursuant to DOT Rules and Regulations, Part 771 Section 771.135 (p) (5) (I), constructive use of an historic property does not occur when "compliance with the requirements of Section 106 of the National Historic Preservation Act and 36 CFR Part 800 for proximity impacts of the proposed action . . . results in an agreement of "no effect" or "no adverse effect."

Section 4(f) applies to the present project because the CalTrain Extension Alternative would require the use of land from the site of the Transbay Transit Terminal, demolition of the Transbay Terminal building, and demolition and removal of the terminal loop ramp that connects the terminal to the San Francisco-Oakland Bay Bridge. The terminal loop ramp and the terminal are both considered contributory elements of the Bay Bridge, which is a National Register of Historic Places (NRHP) eligible resource. Proximity impacts to other NRHP-eligible resources are also evaluated herein, in order to determine whether the CalTrain Extension Alternative would result in constructive use of these properties.

Pursuant to DOT Rules and Regulations Part 771.135 (g) (2), Section 4(f) does not apply to archaeological sites where the FTA, after consultation with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP), determines that the archeological resource is important chiefly because of what can be learned by data recovery and has minimal value for preservation in place, and data recovery is undertaken. On the basis of this qualification, Section 4(f) does not apply to any of the archaeological resources identified or potentially existing in the project APE.[1]

11.2 PROJECT DESCRIPTION

11.2.1 Project Purpose and Need

The Peninsula Commute Service Joint Powers Board (JPB) proposes to extend CalTrain rail service from its present northern terminus at Fourth and Townsend Streets in San Francisco to a station at the site of the present Transbay Terminal, a distance of approximately 1.3 miles. This proposed project would improve CalTrain commute service by providing direct access to downtown San Francisco and enhance regional transit connectivity by improving connections among CalTrain, BART, Muni, AC Transit, SamTrans and Golden Gate Transit services. The project is also expected to serve future travel demand in the San Jose - San Francisco corridor and alleviate traffic congestion on US Highway 101 and I-280 between San Jose and San Francisco as well as other routes; improve regional air quality; enhance accessibility to employment, retail and entertainment opportunities; and support local economic and land use development goals.

11.2.2 Alternatives

Of the various alternatives considered, two alternatives with sub-options were carried forward into detailed engineering and environmental studies. Chapter 2 describes these alternatives and sub-options in detail.

The CalTrain Extension Alternative to the Transbay Terminal Site

The Build Alternative consists of an underground extension of CalTrain from its present San Francisco terminus at Fourth and Townsend Streets to a new underground terminal at the site of the present Transbay Terminal at First and Mission Streets. The extension would consist of two tracks (one each north and southbound), branching to six tracks within the new underground terminal. Alignment and portal options are considered for three segments of the CalTrain Extension Alternative: the Townsend Segment; the Mined Tunnel Segment; and the Folsom Street to Transbay Terminal Segment.

Alignment and Portal Options. Alignment and portal location options (transitioning from at-grade to underground alignment) include: Seventh Street at Channel Street, and continuing underground to the Transbay Terminal site; or Townsend Street just west of Fourth Street and continuing underground to the Transbay Terminal Site. The Fourth Street portal alternative would provide for a surface station along Townsend Street between Fifth and Sixth Streets.

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[1] David Chavez & Associates, *Archaeological Resources Investigations for the CalTrain San Francisco Downtown Extension Project DEIS/DEIR*, revised September, 1996, p. 112.

Alternative horizontal and vertical cut-and-cover and retained cut alignment options along Townsend Street between about Seventh Street and Third Street include Townsend Street-Center, Townsend Street-South, and Townsend Street-South/Subway. Different radius curves affecting tunnel alignment and length are evaluated in the Mined Tunnel Segment transitioning northward from Townsend Street west of Third Street to the present Transbay Terminal site. Cut-and-cover construction is proposed from just north of Folsom Street at Essex Street, continuing across Howard Street, thence turning 90 degrees eastward to the Transbay Terminal site (See Figure 2.3-1)

Propulsion and Storage Yard Options. Three propulsion options are under consideration: (1) dual mode/electric trailer units; (2) new dual mode locomotives; and (3) full system electrification. Also, alternative CalTrain storage yard locations are proposed along and north of King Street between Fifth and about Seventh Street and along Seventh Street/I-280 west of Owens Street between Hubbell and about Sixteenth Streets.

Mitigation Options to Replace Existing Bus Terminal. Implementing the CalTrain Extension Alternative would require demolition of the existing Transbay Terminal building and the terminal loop ramp. Four terminal mitigation options are being considered: (1) a new three-level bus terminal on the site bounded by Main and Beale streets, south of the Pacific Gateway Building property nearly to Folsom Street, with new aerial bus ramps; (2) a new three-level bus terminal directly above the proposed underground CalTrain terminal at the existing Transbay Terminal site, with new aerial bus ramps (this option would require construction of an interim surface bus facility at the Main/Beale site); (3) a new permanent surface bus facility between Main and Beale Streets south of the Pacific Gateway Building; and (4) a surface bus plaza above the CalTrain Terminal Station on the Transbay Terminal Site.

Mitigation for Increased Parking Demand. Expansion is proposed at 13 CalTrain station parking lots on the Peninsula to accommodate increased CalTrain ridership demand.

The No-Build Alternative

The No-Build Alternative represents existing and committed (that is, funded) transportation services and facilities in the project corridor. The No-Build Alternative consists of existing CalTrain service plus funded improvements to the 2010 horizon year, and other committed bus, rail, and roadway improvements.

Alternatives Considered and Withdrawn

Other alternatives considered were withdrawn from further study because they would not accomplish the purpose and need for the project; would severely constrain railroad operations; would have severe community impacts; or would involve extraordinary costs or substantial risk.

11.3 POTENTIALLY AFFECTED SECTION 4(f) PROPERTIES

The CalTrain Extension Alternative would require the use of land from the Transbay Terminal property, demolition of the Transbay Transit Terminal, and demolition of the terminal loop ramp, both contributing elements of the San Francisco-Oakland Bay Bridge, a NRHP-eligible resource.

No other Section 4(f) properties would be required by the Build Alternative, but this alternative would involve tunneling underneath the Rincon Point/South Beach Historic Warehouse-Industrial District. Resources determined eligible for listing on the NRHP, either individually or as contributors to the historic district, stand above the proposed tunnel alignments. These properties are evaluated for potential proximity impacts in Section 11.6 to determine if substantial impairment to the qualities that made them eligible for the National Register would result. Also, expansion of parking areas at the Santa Clara CalTrain Station is evaluated for potential proximity impacts on historic properties at that location.

11.3.1 The Transbay Transit Terminal

The Transbay Terminal at 425 Mission Street occupies land extending from Mission Street on the north to Natoma Street on the south; the terminal building crosses Fremont Street on the east and First Street on the west. It was designed by Timothy Pfleuger, Arthur Brown, Jr. and John J. Donovan, consulting architects. Built in 1939, the Transbay Terminal was the "functional successor to the Ferry Building. When electric trains began arriving over the Bay Bridge, use of the Ferry Building dropped to almost nothing overnight, and the Transbay Terminal took over as the primary gateway to the city." (Caltrans, 1983). It is considered as a contributory element of the historic significance of the San Francisco-Oakland Bay Bridge. The present owner of the Transbay Terminal is the California Department of Transportation. Its current use is for commuter and inter- and intra-regional bus transportation.

11.3.2 The Transbay Terminal Loop Ramp

The Transbay Terminal loop ramp structure constitutes two of the six approach spans that remain from the original San Francisco-Oakland Bay Bridge project. It is considered a contributing element of the Bay Bridge. Originally designed to carry trolley trains from the bridge to the terminal, the ramp's tracks were removed as electrified trains gave way to buses in the late 1950s.

11.3.3 The San Francisco - Oakland Bay Bridge

The San Francisco - Oakland Bay Bridge is an eight and one-half mile long series of connecting structures carrying two levels of traffic between San Francisco and Oakland. Opened to service in 1936, in its original design, the bridge upper level carried two-way auto traffic while the lower level carried truck and trolley traffic. Structurally, the bridge is distinctive is its use of a variety of bridge-building technologies, the length of its 1,400-foot cantilever channel span on the east (Oakland) side, and the length of the two 2,320-foot suspension spans on the west (San Francisco) side. The outstanding engineering feature is the center pier between the two suspension spans of the western half of the bridge. The tunnel connection between the east and west spans on Yerba Buena Island was the first double-decked highway tunnel in the United States. Notable individuals connected with the project were Charles H. Purcell, Chief Engineer; Charles E. Andrew, Bridge Engineeer; Glenn B. Woodruff, Design Engineer; and T. L. Pfleuger, Arthur Brown, Jr., and John J. Donovan, consulting architects. The Bay Bridge was evaluated by Caltrans in 1983 as meeting National Register eligibility criteria A, B, and C at the national level; it was determined eligible for listing in 1985.

11.4 POTENTIAL IMPACTS

The proposed CalTrain Extension would remove the Transbay Terminal and the terminal loop ramp that connects it to the Bay Bridge. This impact would result in an adverse effect under Section 106 and constitute use under Section 4(f).

11.5 AVOIDANCE ALTERNATIVES

Two alternatives with alignment variations within two basic corridors were studied to achieve the project purpose and need. The primary alternative to the CalTrain Extension to the Transbay Terminal Site was the CalTrain Extension to a New Terminal at Market and Beale Streets. Various alignment options and alternative construction techniques by segment -- some common to both alternatives -- were evaluated. Public and other agency and interest group comments on all alignment options were reviewed by the JPB (see Chapter 10). Based upon this evaluation, it was determined that only the CalTrain Extension to the Transbay Terminal Site Alternative was viable.

The CalTrain Extension to a New Terminal at Market and Beale Streets and the reasons why it was withdrawn from further consideration are discussed in the following section. The No-Build Alternative is also briefly discussed. Table 11.4-1 compares the two extension alternatives and the No-Build Alternative in terms of their potential involvement of 4(f)-protected resources.

Table 11.4-1
Involvement of Section 4(f) Properties for CalTrain Extension Alternative and Alternatives Considered and Withdrawn

	Potential Involvement of 4(f) Properties
Alternatives Considered and Withdrawn (See Figure 11.4-1 for Locations)	
1. CalTrain Extension to a New Terminal at Market and Beale Streets	Yes[1]
Alternatives Carried Through DEIS	
2. No-Build Alternative	No[2]
3. CalTrain Extension to a New Terminal at the Transbay Terminal Site	Yes

[1] This alternative would use the PG&E building, which is listed in the NRHP.
[2] Seismic retrofit of the existing Transbay Terminal would still be required.

11.5.1 CalTrain Extension to a New Terminal at Market and Beale Streets

The CalTrain Extension to a new terminal at Market and Beale Streets Alternative would have avoided any involvement of the Transbay Terminal and terminal loop ramp, but had potential to affect the P. G. & E Building at 425 Market, occupying the block between Mission, Market, Beale and Main Streets. Under this alternative, a three-level, stacked underground CalTrain terminal configuration was contemplated for location at Mission and Beale Streets, construction of which would have required cut-and-cover excavation down to 80 feet below ground level and very close to the foundations of this NRHP-listed structure.

The CalTrain Extension to a new terminal at Market and Beale Streets Alternative had been adopted by the JPB as the Locally Preferred Alternative at the onset of the present study, but was ultimately withdrawn from further consideration because of poor constructibility and potentially severe environmental impacts along the proposed alignments from Townsend Street to Beale Street. The reasons for withdrawing this alternative were (see Section 2.5 for details):

1. Cut-and-cover construction down Townsend Street and The Embarcadero implied severe noise and community disruption impacts during construction, as well as potential impact on the Bay Bridge anchorage, and no feasible alternative cut-and-cover alignments were identified from all of the sub-options studied;

2. Mined tunnel options developed to reduce the disruption from cut-and-cover construction were ultimately also rejected because of poor constructibility and unacceptable risks of cave-ins and broken utility lines;

3. There was substantial opposition to this alternative from the adjoining new residential areas that had recently been affected by construction of a new roadway and light rail system.

11.5.2 No-Build Alternative

The No-Build Alternative would not use the Transbay Terminal or loop ramp, but this alternative would not address the project purpose and need.

It should be noted, moreover, that the existing Terminal building requires substantial and costly reconstruction to meet current seismic and other building codes. Such retrofit (to be undertaken by others) may be so extensive as to result in use of the resource under Section 4(f). Given the high costs of retrofit, the City of San Francisco requested Caltrans cooperation in the consideration of replacement alternatives and the results of the City's study have been incorporated into the mitigation options developed for the present project; see Chapter 6.

11.6 MEASURES TO MINIMIZE HARM

There are no remaining viable alternatives that avoid the 4(f) historic property. The Preferred Investment Strategy (when selected) would include all possible planning to minimize harm to the resource. The proposed mitigation measures presented in this section will be coordinated with the State Historic Preservation Officer (SHPO) and Caltrans, and informally discussed with the Advisory Council for Historic Preservation (ACHP), San Francisco Planning Department and Landmarks Preservation Board. It is anticipated that the proposed demolitions of the Transbay Terminal and ramps will result in a finding of adverse effect under Section 106. A Memorandum of Agreement (MOA) will be executed by FTA, JPB, Caltrans, ACHP, and SHPO, if appropriate.

FTA would ensure that the adverse effects to this property would be mitigated by recordation to Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) standards prior to any construction activities. The HABS/HAER documentation for the Transbay Terminal would be filed with the SHPO, the HABS/HAER collection in the Library of Congress, the University of California Bancroft Library, the San Francisco Planning Department and the San Francisco Public Library.

JPB staff with Caltrans and the City and County of San Francisco would develop a display of the photographs produced in the HABS/HAER documentation, for public exhibition. This display would be provided by JPB in the planned new combined bus/rail terminal or at either the proposed new CalTrain terminal or replacement bus facility.

After recordation and at least 30 days prior to demolition, FTA would ensure that the SHPO or its designee has the opportunity to salvage architectural elements for re-use or curation. FTA would ensure that the items selected are removed in a manner that minimizes damage and that they are delivered to the SHPO or its designee. Although recordation mitigates the severity of the effect of demolition, it does not prevent the tangible loss of an historic property.

11.7 OTHER PROPERTIES EVALUATED FOR PROXIMITY IMPACTS

No proximity impacts would occur to any of the 4(f) properties. The CalTrain Extension Alternative would not use air rights over, pass in close proximity to, or cause other visual or noise intrusion on the properties identified. (See Sections 5.8 and 5.21.9 for details on noise and vibration.).

The Build Alternative would pass underneath the Rincon Point/South Beach Historic District Warehouse Industrial District with a mined tunnel. Detail is presented in Section 5.21 for three properties individually listed on the NRHP and 15 properties that are contributors to an historic district that is eligible. Mined tunnel construction was selected for this segment of the alignment in order to avoid direct impacts to the Historic District. Three alternative mined tunnel alignments were evaluated in an attempt to avoid or minimize potential impacts to these Section 4(f)-protected resources. Given the depth of tunneling and the controlled underpinning process that would be employed, damage to historic properties is not anticipated (see Section 5.21.13 for details).

Potential proximity impacts were also evaluated for proposed expansion of parking at the Santa Clara CalTrain station, one of 13 stations where parking expansion is proposed to mitigate potential impacts of increased CalTrain ridership and commensurate parking demand. The 4(f) properties potentially affected include the station building, or depot, which dates from 1864 and is listed in the NRHP, and three NRHP-eligible contributory properties within the expanded historic property boundary: the Interlocking Control Tower structure, the Speeder Shed, and the Utility Shed. Detail on the proposed parking expansion at this station is provided in Section 7.3.

Expansion of parking at the Santa Clara Station would avoid the historic structures and would not impair any of the activities, features, or attributes of these properties that qualify them for protection under Section 4(f). CalTrain parking already exists at the station, proximate to the resources. This parking pre-existed the Register nomination and the expanded historic property boundary. The additional parking would be located to the west of a buffer zone (on which the structures sit) between the proposed and existing parking areas. No other changes to the site are proposed.

These determinations are summarized in Table 11.7-1.

11.8 COORDINATION

The historic and cultural resource investigations conducted for this project have been coordinated with the SHPO and Caltrans; copies of the DEIS and Draft 4(f) Evaluation are provided to the San Francisco Planning Department and Landmarks Preservation Board, and the South Bay Historical Railroad Society.

On August 7, 1996, a meeting was held with SHPO staff to review the project and the findings of the Historic Property Survey Report (HPSR). This was followed by a field review of the historic resources. On October 2, 1996, the SHPO concurred in the eligibility determinations presented in the HPSR (a copy of the SHPO's concurrence letter is included in Appendix F).

Consultation with the SHPO and ACHP will continue through the determination of effects phase of the Section 106 process; results will be included in the Final EIS. Determination of mitigation measures will be coordinated with the ACHP, Caltrans and SHPO.

Table 11.7-1
Evaluation of Potential Proximity Impacts on Section 4(f) Properties

Resources	NRHP Status[2]	Effects Determination[3]	
		No Effect	No Adverse Effect
Rosenberg Bros. Warehouse, 275 Brannan Street	1S		X
South End Warehouse, 625 Second Street	1S, 3D		X
California Warehouse, 699 Second Street	1S		X
Rincon Point/South Beach Historic Warehouse-Industrial District[4]	3D		X
Hawley Terminal, 274 Brannan Street	3D		X
G.E. Warehouse, 355 Bryant Street	3D		X
52 Colin P. Kelly Street	3D		X
Hoopers South End Warehouse, 62 Colin P. Kelly St.	3D		X
130 Townsend Street	3D		X
Clinton Fireproofing, 136 Townsend Street	3D		X
Clinton Construction, 144 Townsend Street	3D		X
Winchester-Simmons Co., 148 Townsend Street	3D		X
L.A. Norris Building, 162 Townsend Street	3D		X
California Electric Light Bldg., 178 Townsend	3D		X
Felton Co./Haslett Warehouse, 601-615 Second Street	3D		X
640 Second Street	3D		X
B.F. Goodrich Rubber Co., 650 Second Street	3D		X
Moore & Scott Bldg., 670-680 Second Street	3D		X
S.F. Fire Dept. Pump Station - 698 Second Street	3D		X
Santa Clara Depot[5]	1S	X	
Interlocking Control Tower	3D	X	
Speeder Shed	3D	X	
Utility Shed	3D	X	

[2] National Register Status codes are as follows:
1S - Separately listed on the NRHP
3D -- Contributor to a district that appears eligible

[3] Pending SHPO concurrence

[4] Locally known as the South End Historic District

[5] Locally known as the Santa Clara Historic Railroad Complex

CHAPTER 12: FINANCIAL ANALYSIS

This chapter presents a financial analysis for the CalTrain San Francisco Downtown Extension. This information is not required for CEQA or NEPA, but is provided for informational purposes.

The process of formulating the financial plan has paralleled development of the environmental analysis presented in this DEIS/DEIR. The financial plan in this DEIS/DEIR is based on financial projections and governmental actions which are not finalized. More concrete information on the financial plan will be presented in the FEIS/FEIR.

Two full project financing scenarios, a staged construction plan and a description of interim CalTrain improvements, are presented in this chapter.

The first financing scenario assumes a short-term strategy with construction beginning in 2000 and completion occurring in 2004. The second scenario assumes a long-term strategy with construction beginning in 2005 (when federal funding is expected to be available for the project) and completion occurring in 2009.

The staged construction plan consists of building an underground shell for the CalTrain Terminal. This plan would enable San Francisco to keep its options open for a downtown rail terminal for CalTrain and/or high speed rail without impacting development in the Transbay area. Interim improvements are projects currently being planned by the JPB to improve service for existing and future passengers.

12.1 PROJECT DESCRIPTION

For purposes of developing a financial plan, a base case alternative was defined to include a six track underground station at the site of the Transbay Terminal. The alternative also assumes a short radius tunnel under South Beach, the Townsend Street South alignment, dual mode locomotive propulsion, and a storage yard at 16th and Owens Street.

12.2 ESTIMATED CAPITAL COSTS

Capital costs for the Base Case are estimated at $656.2 million (see Table 12-1). For purposes of this Financial Analysis, a figure of $656 million is used. The capital cost estimates were prepared at a conceptual level of engineering in July 1995 dollars. In the financing plans outlined below, costs are escalated to the appropriate year of construction.

It should be noted that the cost estimates assume that right-of-way currently owned by Caltrans would be made available for the CalTrain terminal at no cost.

Table 12-1
Estimated Capital Costs - CalTrain Downtown Extension
Base Case Cost Estimates -- (Millions of July 1995 Dollars)

Cost Category	Amount
Construction/Procurement	
Right-of-Way for Extension	$ 9.2
Townsend Street Segment (3,935 feet)	39.3
Mined Tunnel Segment (3,900 feet)	86.5
Folsom-Transbay Terminal Segment (990 feet)	39.9
6-Track Underground Terminal (1,035 feet)	85.2
Traction Power, Signaling & Communications	19.9
New Dual Mode Locomotives (23)	101.2
Additional Gallery Passenger Cars (15)	27.0
San Francisco Satellite Storage Yard	9.9
Subtotal Construction/Procurement	$ 418.1
Engineering and Construction Management	75.0
Contingency	87.6
Project Reserve	40.0
Subtotal - San Francisco Downtown Extension Costs	$ 620.7
Park and Ride Lot Expansion at Peninsula Stations	35.5
Total	$ 656.2

[1] Does not include replacement costs for the Transbay Bus Terminal.
[2] Includes full cost of new dual mode locomotives only $24.2 million of which is directly due to the Downtown Extension Project.

Furthermore, the capital cost estimate of $656 million does not include the estimated cost of replacing the Transbay Terminal even though the Terminal relocation must be accomplished prior to, or concurrent with, construction of the Downtown Extension. This finance plan assumes that an independent funding plan for replacing the Transbay Terminal will be developed by the City of San Francisco, consistent with the City's current planning.

The capital cost estimate does include the full cost of purchasing 23 new dual mode locomotives. However, since CalTrain's existing diesel locomotives must be replaced in the 2005-2010 time period regardless of whether the Downtown Extension is completed, funding for the locomotive replacement is shown separately in the project financing scenarios.

The cost of full electrification from San Francisco to Gilroy (78 miles) is approximately $144 million more than the base case. The total cost of the base case with full electrification is therefore approximately $800 million (1995 dollars).

12.3 PROPOSED REVENUE SOURCES

The basic funding program for the Bay Area's rail expansion program, including the CalTrain Downtown Extension Project, was set-forth in the Metropolitan Transportation Commission (MTC) Resolution 1876. MTC Resolution 1876 assumed that the project would be funded through a limited amount of federal rail modernization program funds and state transportation funds, with the balance funded from local programs. This section outlines proposed funding sources for the downtown extension project.

12.3.1 Federal Transit Administration Section 5309, Fixed Guideway (Formerly Section 3 Rail Modernization)

Fixed Guideway funds are formula grants intended to fund modernization and rehabilitation efforts on fixed guideway systems, including rail, trolley coach and exclusive busways. Generally, these funds are intended to assist rail systems that have been in operation for at least seven years and are typically awarded on a formula basis at an 80 percent match ratio.

MTC Resolution 1876 allocated $109 million (1987 dollars) of Section 3 Fixed Guideway (then Rail Modernization) funding for the Downtown Extension, but did not specify when those funds would become available.

The San Francisco/Oakland Urbanized Area (UZA) currently receives approximately $43.2 million annually in Fixed Guideway formula appropriations. Continued funding is dependent on reauthorization of the Intermodal Surface Transportation Efficiency Act (ISTEA) and on annual Congressional appropriations of Fixed Guideway funds. Assuming that appropriations continue at the current level, the San Francisco/Oakland UZA should receive $302.4 million during the FY1998-FY2004 period.

Existing MTC programming resolutions allocate approximately 97 percent of the total expected San Francisco/Oakland UZA allocation of Fixed Guideway funds to two projects: the BART A/B car rehabilitation program ($162 million) and the San Francisco Municipal Railway light rail vehicle replacement program ($129.4 million). Approximately four percent ($11 million) is tentatively allocated for the Downtown Extension in FY2004.

Following completion of the BART A/B car rehabilitation program and the Muni light rail vehicle replacement program in FY 2004, it is assumed that funds from the Fixed Guideway program will be available to the Downtown Extension project consistent with MTC Resolution 1876. However, the amount available ($109 million in 1987 dollars) is escalated at 3.5 percent per year through FY2006 to $209.5 million.

As described earlier in this section, CalTrain locomotive replacement would take place approximately at the same time as the Downtown Extension Project. Instead of replacing the diesel locomotives, new dual-mode locomotives would be purchased. The Downtown Extension Project would be assessed for the difference between dual-mode locomotives and diesel locomotives. The locomotive replacement program would be assessed for the federal share (80 percent) of diesel locomotive costs. Funds for both the Downtown Extension Project and locomotive replacement program would come from federal Fixed Guideway funds.

12.3.2 Federal Surface Transportation Program (STP) Funding

The federal Intermodal Surface Transportation Efficiency Act (ISTEA) established a flexible source of funding through the Surface Transportation Program (STP) for both highway and transit projects. STP appropriations are distributed on a formula basis and may be used on any projects that would otherwise be eligible for funding under existing FTA grant programs, such as for rolling stock and for the construction, rehabilitation or improvement of fixed rail systems.

STP funding is discretionary. Applications for STP funding must receive endorsement from county CMAs and receive funding from the Metropolitan Transportation Commission. These funds are programmed as part of the Regional Transportation Plan (RTP) and are therefore included in the RTP fund sources presented in the financing scenarios outlined below.

12.3.3 State Revenue Sources

State funding for the CalTrain Downtown Extension project would be programed in the State Transportation Improvement Program (STIP). In the short term very little state funding is available for the project unless significant new state revenues are made available to transit; however, in the long term small amounts of state revenues can be programmed in the post FY2004 time frame. Since STIP funds are programmed as part of the RTP, they are included in the RTP category in the financing scenarios outlined below.

12.3.4 Local Transportation Sales Taxes

A critical source of funding for the CalTrain Downtown Extension project is allocations from existing or extended one-half cent sales tax measures in the three Joint Powers Board counties - San Francisco, San Mateo, and Santa Clara. San Francisco and San Mateo counties have existing sales taxes; and, in November 1996, Santa Clara County voters passed a new nine-year Measure B sales tax and a companion Measure A, which lists a series of transportation improvements. The Measure A list includes CalTrain service as an eligible expenditure.

This financial analysis assumes that San Mateo's Measure A can contribute the remaining $146 million (1996 dollars) identified in the ballot measure for CalTrain improvements. It also assumes that the San Mateo County Transportation Authority has the legal ability to, and will agree to, reprogram the currently remaining $95 million in the Grade Separation Program to the Downtown Extension since it is part of the "Transit" component of the Measure A Program. These sales tax dollars are then escalated at 3.5 percent per year up to the year in which they are expended for program costs.

This financial analysis assumes that $30 million from the nine-year Measure B one-half cent sales tax approved by Santa Clara County voters in November, 1996, is allocated to the Downtown Extension project. Approximately $50 million is identified for CalTrain improvements between San Jose and Palo Alto in Santa Clara County's Measure A transportation project list, such as park and ride lots that are included in the Downtown Extension project.

Finally, this analysis assumes that no funds are available for the project from San Francisco's 1989 Proposition B sales tax, since it did not include the Downtown Extension as an eligible project. However, there is discussion about extending the sales tax beyond its 2009 sunset, and the CalTrain Extension could be an eligible project if this tax is extended.

12.3.5 Regional Gas Tax

The CalTrain Downtown Extension Project's financial analysis indicates that a new revenue source will be necessary to complete the project in either the short-term or long-term scenarios. For purposes of this financial plan that new source was assumed to be a regional gasoline tax.

The Metropolitan Transportation Commission has proposed a regional gasoline tax in its state legislative program and as part of its Regional Transportation Plan (RTP). The tax would be used to fund critical transportation projects throughout the Bay Area, including the CalTrain Downtown Extension project, over the next twenty years.

The tax would need to be approved by voters. In order to place this user fee on the ballot, the State legislature would need to pass enabling legislation. The MTC attempted to have similar legislation passed in 1994 and 1996, but was unsuccessful.

MTC's most current proposal was a ten-cent per gallon tax in the nine county Bay Area. Under this tax proposal MTC has projected the amounts made available to each county on a return-to-source basis; in FY2002, MTC estimates that San Francisco would receive $30.5 million, San Mateo County $27.5 million, and Santa Clara County $65.5 million. Total revenues to the three JPB counties would be $123.3 million. These revenues are expected to grow by less than one percent per year due to the relatively flat annual growth of gasoline consumption and no "real" increase in the price of gasoline.

If enacted, a portion of the gasoline tax revenues to the three JPB counties could be used to float bonds to pay for project capital costs. The bonding assumptions include a 125 percent coverage ratio on the bonds, bond insurance, and an "A" rating on the bonds. The bonds would be issued for 20 years and carry an all-in true interest cost of 5.76 percent. The issue would be composed of a combination of serial and term bonds. Gas tax revenues would be allocated over the 20-year life of the gas tax.

In both scenarios, a larger share of regional gas tax funds could be allocated to the project in lieu of other funding programs (e.g., RTP Funds) should other programs be oversubscribed.

12.4 PROPOSED FUNDING PLANS

This section outlines the two potential funding strategies for completing the CalTrain Downtown Extension project. These strategies are not intended to represent the final funding position of each participating agency or imply a funding commitment from each agency. Rather, the funding strategy for the "short-term" and "long-term" scenarios simply represents what commitments would be required by the involved agencies if such a strategy were to be implemented.

This section also includes a description of the "staged-project" scenario although a detailed funding strategy for it would be developed as part of the FEIS/FEIR study. Finally, Section 12.4.4 describes interim CalTrain improvements that could be completed as part of a future capital improvement program.

12.4.1 Short-Term Financing Scenario

The short-term scenario assumes that construction for the Downtown Extension would begin in 2000. This date assumes that a decision to proceed with the project would be made in 1997. Following the decision to proceed, the project would require approximately six-to-nine months to complete the final environmental document and approximately two years of engineering. A design/build approach would be used to complete the project. A five year construction period is assumed starting in 2000 with completion in 2004.

Capital costs estimated for the Downtown Extension are $656 million (July 1995 dollars). This analysis assumes that the costs will escalate at 3.5 percent annually to the mid-point of construction (FY2002). Therefore the total project cost to be financed in the short-term scenario will be an estimated $836 million.

In the short term three existing funding sources would be available for the project: the San Mateo County sales tax, Santa Clara County sales tax, and Regional Transportation Plan (RTP) funds. These existing sources do not completely fund the project; therefore, for purposes of this financial analysis, it is assumed that a new source (a regional gasoline tax) is available. Assumptions for each of these sources are outlined below.

San Mateo County's Measure A Sales Tax - As described above, Measure A has an estimated $146 million remaining under the "CalTrain Improvements" category programmed for the downtown extension project along with $95 million in Grade Separation project money that could be reprogrammed to the project. When escalated to the estimated time of expenditure (FY2002), these dollars grow to a combined $296 million ($179 million from CalTrain Improvements and $117 million from Grade Separations).

Santa Clara County's Measure A Sales Tax - This analysis assumes that $30 million from Santa Clara County's recently passed sales tax program will be applied to project related costs.

RTP Funds - In each of the JPB member counties, contributions to the CalTrain Downtown Extension project are assumed from funds programmed from various sources such as Flexible Congestion Relief, STP and other formula funds. Relatively small amounts ($10 million) are assumed from Santa Clara and San Mateo Counties due to their large contributions from other sources. In lieu of other contributions, San Francisco County is assumed to contribute $50 million from this source. These estimates are consistent with the 1996 RTP.

Regional Gas Tax - Table 12-2 summarizes existing and new sources of revenue assumed to finance the short-term scenario. As shown in Table 12-2, existing sources would account for approximately $396 million of the required $836 million capital cost. Thus, approximately $440 million would be needed from a regional gasoline tax.

In 1999, when the gasoline tax revenue bonds would be issued under the short-term scenario, the three JPB counties would receive $121.8 million per year in revenues from the proposed regional gasoline tax. An estimated $37.2 million of those funds could be used to secure the necessary $440 million of revenue bonds required to finance the project funding shortfall in the short term scenario. In this scenario, approximately 30 percent of the available gasoline tax revenues to the three counties would be used to finance the bonds.

Table 12-2
Potential Sources of Funds - Near-Term Scenario
(Millions of Escalated Dollars)

Source	Amount
Existing Sources:	
San Mateo County:	
Measure A - CalTrain	$179
Measure A - Grade Separation	117
RTP Funds	10
Santa Clara County:	
Measure A	30
RTP Funds	10
San Francisco County:	
RTP Funds	50
Subtotal: Existing Sources	**396**
New Sources:	
Bond Proceeds - Gas Tax Revenue Bonds	440
Total Sources	**836**
Project Cost	**836**

12.4.2 Long-Term Financing Scenario

The long-term financing scenario assumes that construction on the Downtown Extension would not begin until 2005. That date was chosen because it is the earliest that FTA Fixed Guideway grants would be available to start the project under current programming assumptions. Construction would take approximately five years.

The total project cost to be financed in the long term scenario is estimated at $960 million based upon a midpoint of construction of 2006 and an escalation rate of 3.5 percent.

In the long-term scenario, all of the revenue source assumptions would be the same as the short-term scenario except for two sources: San Mateo County sales tax revenues would increase with inflation and federal Fixed Guideway funds would be available for the project.

San Mateo County's Measure A Sales Tax -- The combined CalTrain Improvements and Grade Separation components of the Measure A sales tax program would continue to grow by 3.5 percent per year. In the long term scenario, those revenues would be approximately $340 million.

Federal Fixed Guideway Funds -- This alternative assumes that with the completion of the BART A/B car rehabilitation and the replacement of Muni light rail vehicles, funds from the Section 5309 Fixed Guideway program can be used by the Downtown Extension.

In 1987, MTC adopted Resolution 1876, which identified $109 million from the federal fixed guideway program to be available for the CalTrain Downtown Extension project. This initial commitment, when escalated at 3.5 percent per year to the year of expenditure in FY2006 grows to $209.5 million. Since future federal authorizations and appropriations are unknown at this time for the Fixed Guideway program, this assumption may require multiple reauthorizations and use of short-term financing instruments.

In addition to funds dedicated to the CalTrain Downtown Extension Project per se, Federal Fixed Guideway funds would also be used to purchase replacement locomotives for CalTrain since its existing locomotives will have reached the end of their useful lives by the Year 2009. Federal Fixed Guideway funds can be used for 80 percent of the escalated cost of 23 new diesel locomotives (total cost of $152.2 million). This amount is calculated at $121.8 million, all of which would be necessary with or without the downtown extension.

Regional Gas Tax --Table 12-3 summarizes existing and new sources of revenue assumed to finance the long-term scenario. As shown in Table 12-3, existing sources would account for approximately $772 million of the required $960 million capital cost. Thus approximately $188 million would be needed from a regional gasoline tax.

In 2003, when the gasoline tax revenue bonds would be issued under the long-term scenario, the three JPB counties would receive $124.2 million per year in revenues from the proposed gas tax. An estimated $17 million of those funds could be used to secure the necessary $188 million of revenue bonds required to finance the project funding shortfall in the short term scenario. In this scenario, approximately 14 percent of the available gasoline tax revenues to the three counties would be used to finance the bonds (under the same bonding assumptions made in the short-term scenario).

Table 12-3
Potential Sources of Funds - Long-Term Scenario
(Millions of Escalated Dollars)

Source	Amount
Existing Sources:	
Federal Fixed Guideway -- DTX Construction	$210
Federal Fixed Guideway -- Replacement Locomotive	122
San Mateo County:	
Measure A - CalTrain	$340
RTP Funds	10
Santa Clara County:	
Measure A	30
RTP Funds	10
San Francisco County:	
RTP Funds	50
Subtotal: Existing Sources	**772**
New Sources:	
Bond Proceeds - Gas Tax Revenue Bonds	188
Total Sources	**$960**
Project Cost	**$960**

12.4.3 Staged Construction Plan

As described above, the short-term scenario will require that a regional gas tax be approved by the state legislature and the voters of the nine Bay Area counties within the next two years. At present, there seems to be a low likelihood that the regional gas tax will be in place to implement the short-term scenario. Therefore, the JPB has developed a staged construction plan for the Downtown Extension.

The essence of the staged project is to construct an underground shell for San Francisco's downtown rail terminal at the Transbay Terminal site for future use by CalTrain and high speed rail service. This shell would be built when the Transbay Bus Terminal was demolished, following construction of a new bus transit terminal by the City of San Francisco. During the time period between construction of the shell and construction of the CalTrain extension, the shell could be used for automobile parking or midday bus storage.

A detailed funding program for the staged project alternative will be developed as part of the FEIS/FEIR should the JPB select this scenario for closer examination. The capital cost of the shell ranges from approximately $110 million to $167 million depending upon how much of the cut-and-cover tunnel along the West Terminal ramps is constructed.

The staged project would combine aspects of the CalTrain Downtown Extension project and replacement of the Transbay Bus Terminal. Thus, several additional sources of funds could be available for the staged project including: State Seismic and Safety Code Upgrade Funds, funds from sale or redevelopment of surplus property, joint development, tax increment revenues, midday bus storage fees and parking revenues. In developing a funding program for the staged project, the JPB would need to work closely with Caltrans and the City of San Francisco, since these agencies are considering use of these sources for construction of the new bus terminal.

A critical state and local interest would be served by constructing an underground shell for a future CalTrain/high speed rail terminal. The State Intercity High Speed Rail Commission and City of San Francisco have indicated their preference for a downtown San Francisco rail terminal, and the staged construction scenario would significantly reduce the construction impacts and cost for this downtown terminal.

The "staged-project" for completing the rail terminal shell simultaneously with demolition of the Transbay Terminal has the following key benefits:

1. Minimizes Construction Impacts -- Building a shell that can be converted into San Francisco's future CalTrain and High Speed Rail terminal without requiring significant new construction in the Transbay Terminal area will minimize construction impacts and encourage development on surrounding land to take place sooner;

2. Utilizes Transbay Terminal Site -- Building the first stage of the CalTrain Extension project ensures that the Transbay Terminal site will not remain vacant until the train extension project can be completed;

3. Joint Development -- Joint development could be built as part of the shell construction or immediately upon the shell's completion; funds from joint development could be used by the JPB to complete the downtown extension project sooner;

4. Preserves Opportunity for Downtown San Francisco Rail Terminal -- From a cost and impact standpoint, the Transbay site appears to be the best site, and most likely the only possible site, for a downtown San Francisco rail terminal; building the shell preserves the opportunity for a rail terminal in downtown San Francisco.

5. Reduces Cost of Full Build Project -- Constructing the shell would reduce the cost of the full build project by allowing construction to take place simultaneously with demolition of the Transbay Bus Terminal several years earlier than under the Long-term Scenario.

12.4.4 CalTrain System Upgrades

As outlined in the Metropolitan Transportation Commission/JPB San Francisco Downtown Extension/System Upgrades Study, the JPB plans to make a series of improvements to CalTrain service over the next 10 years. These improvements are described in the CalTrain SRTP and are outlined below. Most of these improvements are considered transit capital replacement projects a category of projects which receives the highest priority in the Bay Area's Regional Transportation Plan (RTP).

Maintenance Facility -- CalTrain plans to construct a new maintenance facility. This facility could be located in an area that will facilitate construction of the Downtown Extension in the future. Funding for the facility has been programmed in the region's Transportation Improvement Program (TIP). The JPB has started preparation of conceptual engineering and environmental studies of maintenance facility site options.

Increased CalTrain Service -- CalTrain service would be increased incrementally from the existing 60 daily trains to 86 daily trains. This project will be financed using local funds and is being evaluated in CalTrain's planning for higher levels of service.

Peninsula Station Park-and-Ride Expansion -- In order to meet increasing demand for parking at Peninsula stations park-and-ride facilities at fifteen stations will be expanded during the next several years. A detailed implementation plan (i.e. schedule) for this expansion program will be developed as part of CalTrain's annual Capital Improvement Program (CIP). Chapter 7 of this DEIS/DEIR assesses the environmental impacts of the entire park-and-ride expansion program. The cost of the park-and-ride expansion program is estimated at $35.5 million (1995 dollars) or $38 million in 1997 dollars. The JPB will submit a funding request to the MTC to include the park-and-ride expansion program in the 1998 RTP.

Peninsula Station Rehabilitation and Access Improvements -- A series of improvements to Peninsula stations and access is planned during the next ten years. These improvements include basic maintenance and replacement of stations, improving disabled access and installation of ticket vending machines. Access improvements include transit, bicycle and pedestrian access improvements. Finally, CalTrain would support local efforts to build transit oriented development around stations.

The cost of these improvements is estimated at approximately $20 million (1997 dollars) over the next ten years. The 1994 RTP and CalTrain SRTP include funding for the improved access as part of CalTrain station rehabilitation and non-key station access improvements projects.

Track and Subsurface Rehabilitation -- Rehabilitating CalTrain's rail and subsurface is a critical transit capital replacement need. A specific plan for completing this project is currently being developed by the JPB for the 1997 Capital Improvement Program. Under the JPB's plans track would be brought into an improved state of repair enabling faster running speeds and more comfortable rides.

The track rehabilitation program consists of replacing the existing mainline jointed rail with continuous welded rail (CWR) and rehabilitating existing CWR. A preliminary estimate of cost for completing this program is $47.6 million (approximately 45 miles of new track, replacing joints in existing welded rail, replacing grade crossings and rail grinding).

The subsurface rehabilitation program consists of replacing deteriorated ties and fouled ballast. Normally railroads perform these operations on a regular basis, however, this type of maintenance was deferred while the SP owned the right-of-way. Therefore a series of remedial upgrades must be made to deteriorated ties and fouled ballast. The cost of this rehabilitation is estimated at approximately $33.6 million. The total cost of the track and subsurface rehabilitation program is $81.2 million. These improvements are funded in the 1994 RTP's Transit Capital Replacement program.

Signal System Improvements -- CalTrain plans to improve its signaling system to enable trains to pass and to make short turns. This project consists of constructing new universal crossovers, interlockings, train leaving signals, signal upgrades, highway grade crossing upgrades and centralized train control (CTC) on segments of the CalTrain line. The cost of this project is estimated at $46.2 million. The JPB is developing a more detailed estimate and project description for CalTrain's 1997 Capital Improvement Program and will submit the project to the MTC for inclusion in the 1998 RTP as a transit capital replacement project.

CalTrain Interim Improvements Funding Scenario

The CalTrain Interim Improvements Funding Scenario was developed to provide a CalTrain project that could be funded in the short-term. Of the improvements that will be carried out as part of this scenario, the maintenance facility is already programmed in the region's Transportation Improvement Program, so it does not need to be funded; the station access improvements ($20 million) and rail rehabilitation ($81.2 million) are funded under the 1994 RTP's transit capital replacement program; finally, the signal system improvement project ($46.2 million) and parking lot expansion program ($38 million) will be submitted to the MTC for funding in the 1998 RTP from the transit capital replacement program.

Table 12-4 presents a proposed funding program for those additional improvements submitted for funding in the 1998 RTP ($84.2 million). Funding for these upgrades would not come from funds reserved for the Downtown Extension project except to the extent that the upgrades would include funding for park-and-ride lot expansion.

Table 12-4
Potential Sources of Funds
CalTrain Downtown Extension Project: Stage 1
(Millions of Escalated Dollars)

Existing Sources	Amount
Federal Fixed Guideway	$12.0
San Mateo County:	
Measure A - CalTrain Improvements	110.4
RTP Funds	0.0
Santa Clara County:	
Measure A - CalTrain Improvements	30.0
RTP Funds	0.0
San Francisco County:	
RTP Funds	15.0
Project Cost	**$167.4**

Under the 1994 RTP Improvements scenario, the MTC provided estimates of funding available from RTP sources for the period until 2004. As shown in Table 12-4, the total available from RTP funds and federal fixed guideway funding (currently allocated to planning the downtown extension project, but which could be reprogrammed) is $67 million. In order to fund the additional $34 million, approximately $19 million would be borrowed from the San Mateo County Transportation Authority and $15 million would be provided by Santa Clara County's Measure A program (to fund CalTrain improvements in Santa Clara County). Funds allocated as part of Regional Transportation Plan (RTP) process for years following 2004 would be used to pay-back the SMCTA for advancing funding.

Under the 1998 RTP New Projects, Table 12-4 shows a combination of RTP funds from the three counties and San Mateo County Measure A and Santa Clara County Measure A funds. The park-and-ride lot expansion could be funded from sources described earlier in this chapter for the downtown extension project since it is required as part of the downtown extension. The signal system improvements would be funded as part of the region's transit capital replacement program.

Finally, the JPB has adopted formulas in the past for funding capital improvements similar to those included in the CalTrain Interim Improvements Scenario; it is expected, therefore, that the member counties would negotiate a financial plan for the CalTrain Interim Improvements Scenario, starting from the figures presented in Table 12-4, for inclusion in the FEIS/FEIR.

12.5 CALTRAIN OPERATING AND MAINTENANCE COST FINANCIAL PLAN

CalTrain operations are currently financed through a combination of federal, state and local funds. Under the Base Project Alternative (dual mode locomotives), CalTrain's annual operating and maintenance costs will increase by $6,767,000 (60 daily trains) or $7,973,000 (86 daily trains) with the extension to the downtown terminal over the No-Build Alternative. Approximately 17,400 (60 daily trains) and 17,800 (86 daily trains) passengers would use the new CalTrain Downtown San Francisco Station in the year 2010.

Since the downtown extension would create an average travel time savings of 7 to 10 minutes, passengers would be willing to pay a higher fare over existing. As shown in Table 12-6, assuming passengers would be willing to pay $0.75 extra for a trip downtown, the additional revenues would be $3,627,900 (60 daily trains) and $3,711,300 (86 daily trains).

In addition to a fare surcharge for downtown terminal passengers, overall CalTrain revenue would increase with the higher overall ridership. Ridership is projected to increase approximately 100 percent (from 21,776 to 43,400 daily passengers); with an average revenue per passenger of $2.00 (Fall 1996). The additional passengers should generate approximately $10,812,000 annually (86 trains.)

Finally, with extension of CalTrain to downtown San Francisco the Muni shuttle buses that transport CalTrain passengers between the 4th and Townsend Station and downtown could be eliminated. The Muni shuttle service currently costs the JPB $558,000 per year.

Therefore, as shown in Table 12-5, with a fare surcharge, additional passenger fare revenue and elimination of Muni shuttle bus service to Fourth and Townsend streets, there should be a net surplus in operating and maintenance costs, which could enable the JPB members to reduce operating subsidy grants in the future. Finally, it should be emphasized that this financing plan will be revisited in the Final EIS/EIR phase of the project.

Table 12-5
CalTrain Downtown Extension Project
Operating and Maintenance Cost Financing

Description	60 Trains/Day	86 Trains/Day
Annual DTX Passengers	$ 4,837,200	$ 4,948,400
Fare Surcharge Revenue	3,627,900	3,711,300
Additional Passenger Revenue	9,287,000	10,812,000
Eliminate Muni Shuttle Service	558,000	558,000
Gross Revenue Increase	**$ 13,472,900**	**$ 15,081,300**
Increase O&M Cost	6,767,000	7,973,000
Net Revenue Increase	**$ 6,705,900**	**$ 7,108,300**

APPENDIX A: COMPLIANCE WITH JOINT FHWA/FTA PLANNING REGULATIONS

(PROMULGATED UNDER THE INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT -- ISTEA)

For nearly a century, bringing passenger trains directly into downtown San Francisco has been the subject of scrutiny and debate. Recent studies have included the 1975 Peninsula Transit Alternatives Project (PENTAP), the 1984 Caltrans San Francisco Terminal Relocation Study, the 1987 JPB Interim Upgrade Study, and the 1994 MTC/JPB CalTrain Downtown Extension/Systems Upgrade Study.

The JPB requested and received authorization in 1989 from the Urban Mass Transportation Administration (UMTA), now the Federal Transit Administration (FTA), to prepare an Alternatives Analysis and Draft Environmental Impact Statement/Environmental Impact Report (AA/DEIS/ DEIR) for the project, and a Notice of Intent was published in the Federal Register on January 18, 1989. A series of public meetings and JPB agenda items provided the public with the opportunity to identify alternatives and environmental issues and possible mitigation measures to be addressed in the AA/DEIS/DEIR. Comments from public meetings along with an initial screening of alternatives led to the three alternatives that were identified for inclusion in the AA/DEIS/DEIR. A draft AA/DEIS/DEIR was prepared in 1991, but was not approved for circulation due to a lack of funding commitments for the local share of project costs.

On March 23, 1994, a multi-agency consultation meeting was held to discuss how planning for the proposed extension conforms to the October 28, 1993 Joint FHWA/FTA Planning Regulations promulgated under the Intermodal Surface Transportation Efficiency Act (ISTEA). In attendance were representatives of the Peninsula Commute Joint Power Board (JPB), Federal Transit Administration (FTA), the Metropolitan Transportation Commission (MTC), the Federal Highway Administration (FHWA), the State Department of Transportation (Caltrans), the San Francisco County Transportation Authority (SFCTA), the San Francisco Public Utilities Commission (SFPUC), and the San Francisco Municipal Railway (Muni).

It was the consensus of this group that the various studies, alternatives analyses, public scoping and informational meetings, and agency coordination satisfied the requirements for a Major Investment Study (MIS) and that the project could proceed into environmental review and preliminary engineering. It was also agreed that a Notice of Intent to Prepare an Environmental Impact Statement and a Notice of Preparation for an Environmental Impact Report would be reissued for the project, which occurred in May 1995. Extensive public involvement, including review of design options and their associated characteristics, has been continued as part of the preparation of this DEIS/DEIR, and is described in Chapter 10.

APPENDIX B: REFERENCES/BIBLIOGRAPHY/CONTACTS

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AGS, Inc., March 1996, Data on Historic District Buildings in the Vicinity of Townsend Street and Collin P. Kelly, Jr. Street, San Francisco, CA.

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APPENDIX C: LIST OF PREPARERS

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APPENDIX D: DEIS/DEIR DISTRIBUTION LIST

The following agencies, organizations, and groups received a copy of this DEIS/DEIR:

Federal Agencies

Federal Highway Administration
Federal Railroad Administration
Department of Transportation, Office of the Secretary
Army Corps of Engineers
Council of Environmental Quality
Department of Commerce
Department of Energy
Department of Housing and Urban Development
National Transportation Safety Board
Environmental Protection Agency
Department of the Interior (including Fish and Wildlife Service)
National Oceanic and Atmospheric Administration
Department of Agriculture
Advisory Council on Historic Preservation
Federal Emergency Management Agency
Interstate Commerce Commission
General Services Administration

State Agencies

Air Resources Board
Business, Transportation and Housing Agency
California Coastal Commission
Department of Fish and Game
Department of Housing and Community Development
Department of Parks and Recreation, Historic Preservation Office
Department of Parks and Recreation, State Railroad Museum
Department of Toxic Substances Control Region 2
Department of Transportation, Division of Transportation Planning
Department of Transportation, District 4 Director
Department of Water Resources
High Speed Rail Commission
Office of Planning and Research
Public Utilities Commission
State Resources Agency
Water Resources Control Board

Elected Officials

San Francisco State Assembly Members
San Francisco State Senators
San Francisco Board of Supervisors
Office of the San Francisco Mayor
San Mateo County Board of Supervisors
Santa Clara County Board of Supervisors

Regional Agencies

Association of Bay Area Governments
Bay Area Air Quality Management District
Metropolitan Transportation Commission
San Francisco Bay Regional Water Quality Control Board
Santa Clara County Transportation Authority

San Mateo County Transportation Authority

City and County of San Francisco Agencies

Redevelopment Agency
Planning Commission
Public Transportation Commission
County Transportation Authority
Office of Environmental Review
Landmarks Preservation Advisory Board
Department of Parking and Traffic
Port of San Francisco
Public Works Department
Real Estate Department
Recreation and Park Department
San Francisco Transportation Authority
San Francisco Public Libraries
City School District
Water Department
Waterfront Transportation Projects

Peninsula Cities

City of Belmont
City of Burlingame
City of Hillsdale
City of Menlo Park
City of Millbrae
City of Palo Alto
City of San Bruno
City of San Carlos
City of San Mateo
City of Santa Clara
City of South San Francisco

Transit Operators

AC Transit
Amtrak
Bay Area Rapid Transit District
Golden Gate Transit
San Francisco Municipal Railway
San Mateo Transit District

Conservation and Environmental Groups

American Lung Association
Planning and Conservation League
San Francisco Tomorrow
Sierra Club

Transit and Transportation Groups

Modern Transit Society
International Institute for Surface Transportation Policy Studies
California State Railroad Museum Docents
Transportation Management Association
California Transit Association
Train Riders Association of California

Community Organizations

San Francisco Chamber of Commerce
Rotary
Lions
Soroptimists
NAACP

Business Groups

Bay Area Council
Catellus Development Corporation
Pacific Bell
Pacific Gas and Electric
Union Pacific Railroad
Santa Clara Valley Manufacturing Group

Southern Pacific Transportation Co.

Local Neighborhood Groups

Black American Political Association
Downtown Association
San Mateo County League of Women Voters

Citizens' Advisory Committees

CalTrain Citizens' Advisory Committee
Rincon-South Beach Citizens' Advisory Committee
SamTrans Citizens' Advisory Committee
San Mateo Transportation Authority Citizens' Advisory Committee
Transbay Area Citizens' Advisory Committee

APPENDIX E: DEFINITIONS, ABBREVIATIONS AND ACRONYMS

Definitions and Abbreviations

AA/DEIS/DEIR - Alternative Analysis/Draft Environmental Impact Statement/Report. A draft report that analyzes potential environmental effects of proposed transit project alternatives in accordance with UMTA guidelines [now superseded by FTA Metropolitan Planning Regulations], and in compliance with NEPA and CEQA.

acre - A unit of measurement of area equivalent to 43,560 square feet.

alluvium - Deposits resulting from the operations of water including floodplains, lakes, rivers and fans at the foot of mountain slopes.

borrow - Earth brought in from another location to be used as fill material.

candidate species - Any species of fish, wildlife or plant which has been determined to be a candidate for listing under Section 4 of the Endangered Species Act of 1973 (amended).

cfs - Cubic feet per second.

cms - Cubic meters per second.

Corps of Engineers - (COE) U.S. Army Corps of Engineers. Federal agency with jurisdiction over wetlands and waters of the U.S.

cultural resources - Archaeological and historic resources that could potentially be affected by a given project. Cultural resources include buildings, sites, districts, structures or objects having historical, architectural, archaeological, cultural or scientific importance.

cumulative impact - The impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions.

dBA - A sound level in decibels, measured with a sound level meter having metering characteristics and frequency weighting specified in American National Standard Specifications for sound level meters ANSIS1.4-1971. It is common to refer to numerical units of an A-weighted sound level as "dBA."

endangered species - Any species of fish, wildlife or plant which has been determined to be endangered under Section 4 of the Endangered Species Act of 1973 (amended). This definition is adopted from the USFWS, Section 7 regulations, 51 FR 19926.

EPA - U.S. Environmental Protection Agency. The federal agency responsible for maintaining environmental quality including air quality, noise and hazardous waste management.

FEIS/EIR - Final Environmental Impact Statement/Report. A report that identifies and analyzes potential environmental effects of a preferred project alternative and responds to comments received on the DEIS/R.

fill - Earth used to create embankments or to raise low-lying areas in order to bring them to grade.

floodplain - The part of the ground surface inundated with water on a recurring basis, usually associated with the one percent recurrence interval (100-year) flow.

g - horizontal ground acceleration

gram - Unit of measurement of mass, metric system.

ha - hectare (10,000 square meters)

HOV - High Occupancy Vehicle. A"carpool," or vehicle occupied by two or more persons.

HOV Lane - High Occupancy Vehicle lane. A system of exclusive lanes signed and striped for use by vehicles with multiple occupants (two or more persons) or ridership. HOV lanes are designed on roadways to reduce traffic congestion, improve safety, reduce fuel consumption and to improve air quality.

Kilo - Prefix used in metric measurement, 1000.

kiss-and-ride - A passenger loading area where vehicles can pick up and drop off passengers.

km - Kilometer.

kmph - Kilometer per hour.

Ldn - Day-Night Equivalent Sound Level. A 24-hour equivalent sound level with a 10 dB penalty assessed to noise events occurring at night (10 p.m. to 7 a.m.).

Leq - Equivalent Sound Level. A measure of sound energy over a period of time, or a sound level which, in a stated period of time, would contain the same acoustical energy as the time-varying sound during the same period.

liter - Unit of measurement of volume (metric system).

LOS (Level of Service) - The operating level of an intersection or roadway segment can be described using the term Level of Service. Level of Service is a qualitative description of operation based on delay and maneuverability. It can range from "A," representing free flow conditions, to "F" representing gridlock.

m - Meter.

mitigation - Measures taken to minimize adverse environmental impacts. Mitigation could reduce the magnitude and extent of an impact from a level of significance to a level of insignificance.

mph - Miles per hour.

National Historic Preservation Act of 1966 - The primary federal law pertaining to protection of cultural resources.

National Register of Historic Places - A federal listing of historic resources protected under the National Historic Preservation Act of 1966.

NEPA - National Environmental Policy Act. The United States' basic national charter for protection of the environment. It establishes policy, sets goals and provides means for carrying out the policy.

nonpoint source - Pertains to the discharge of pollutants into waters or air where the pollutant sources come from an area rather than a single source that can be pinpointed.

NO_X - Nitrogen Oxide.

National Register-eligible - Cultural resources determined eligible for inclusion on the National Register of Historic Places.

O_3 - Ozone.

ozone - A major component of photochemical smog, which is formed in the atmosphere by the chemical reaction between nitrogen dioxide and organic gases in the presence of sunlight. Excessive levels of ozone can cause eye irritation, reduced visibility, vegetation damage and aggravation of respiratory conditions. The biggest source of these gases is the automobile.

park-and-ride - A parking area intended for transit riders who arrive at transit stations by car.

Pb - Lead.

PM_{10} - Particulate matter less than 10 microns in diameter. (One micron is equal to one-millionth of a meter.)

ppm - parts per million.

PPV - Peak particle velocity. The maximum instantaneous peak in the velocity of an object's vibratory motion. The PPV is used to define thresholds of potential building damage from vibration.

Preferred Investment Strategy - The lead agency's favored approach or alternative (essentially equivalent to the "locally preferred alternative").

right-of-way - Land dedicated to the transportation facility.

riparian - An aquatic or terrestrial ecosystem that is associated with bodies of water, such as streams, lakes or wetlands, or is dependent upon the existence of perennial, intermittent or ephemeral surface or subsurface water drainage. Riparian areas are usually characterized by dense vegetation and an abundance and diversity of wildlife.

RMS - Root-mean-square amplitude. The average energy of vibrating measured over a short time interval, usually one second. RMS vibration velocity is considered the best available measure of potential human annoyance from ground-borne vibration.

Section 106 - Section 106 of the National Historic Preservation Act of 1966.

SO_2 - Sulphur Dioxide.

special status species - Any species of fish, wildlife or plant that is officially listed as rare, threatened or endangered or candidate for rare, threatened or endangered species listing under the State or federal Endangered Species Acts.

State Implementation Plan (SIP) - A plan for attaining national ambient air quality standards required by the Clean Air Act.

TDM - Transportation Demand Management. Strategies or techniques to decrease single occupant vehicle traffic on streets by encouraging the use of carpools, transit ridership, bicycle travel and telecommuting.

TSM - Transportation System Management. Strategies or techniques to increase the capacity of a transportation system through relatively low cost improvements.

USFWS - U.S. Fish and Wildlife Service. The federal agency that administers the federal Endangered Species Act and is involved in protection of fish and wildlife habitat including wetland areas.

Vdb - Decibels of vibration velocity. An expression of ground-borne vibrations.

watershed - That part of the earth's surface from which storm water runoff flows to a single point.

wetlands - According to the U.S. Army Corps of Engineers, wetlands are areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes and similar areas, and are subject to protection under Executive Order 11990 and Section 404 of the Clean Water Act (CWA).

Glossary of Acronyms

AA/DEIS/EIR	Alternative Analysis/Draft Environmental Impact Statement/Report
AC Transit	Alameda Contra Costa Transit District
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
APE	Area of Potential Effects
APTA	American Public Transit Association
BAAQMD	Bay Area Air Quality Management District
BCDC	Bay Conservation and Development Commission
CAA	Clean Air Act of 1970
CAAQS	California Ambient Air Quality Standards
CAC	Community Advisory Committee
CALINE4	Computer model used to predict carbon monoxide levels
CALTRANS	California Department of Transportation
CARB	California Air Resources Board

CBD	Central Business District
CCAA	California Clean Air Act
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CERCLIS	Comprehensive Environmental Response Compensation Information System
CFR	Code of Federal Regulations
CLUP	Comprehensive Land Use Plan
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	Carbon Monoxide
COE	Army Corps of Engineers
CUPC	California Public Utilities Commission
DEIS/EIR	Draft Environmental Impact Statement/Environmental Impact Report
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FEIS/EIR	Final Environmental Impact Statement/Report
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
FVM	Fare Vending Machine
FY	Fiscal Year
GGBHT	Golden Gate Bridge, Highway and Transportation District
HOV	High Occupancy Vehicle
I-280	Interstate 280
ISTEA	Intermodal Surface Transportation Act of 1991
JPB	Peninsula Corridor Joint Powers Board
LOS	Level of Service
LPA	Locally Preferred Alternative
LUST	Leaking Underground Storage Tank
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
Muni	San Francisco Municipal Railway
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Properties

O&M	Operating and Maintenance
OSHA	Occupational Safety and Health Administration
PIS	Preferred Investment Strategy
PPA	Pollution Prevention Act
ROD	Record of Decision
RTP	Regional Transportation Plan
SAA	Streambed Alteration Agreement
SAMTRANS	San Mateo County Transportation
SFBRWQB	San Francisco Bay Regional Water Quality Control Board
SHPO	State Historic Preservation Office or Officer
SIP	State Implementation Plan
SP	Southern Pacific (Railroad)
SPR	Southern Pacific Railroad
STP	State Transportation Program
STIP	State Transportation Improvement Program
SWPPP	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TAZ	Traffic Analysis Zone
TCM	Transportation Control Measure
TDM	Transportation Demand Management
TIP	Transportation Improvement Program
TRP	Trip Reduction Program
TSM	Transportation Systems Management
US 101	US Highway 101
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
UST	Underground Storage Tank
VC	Volume-to-Capacity Ratio
VHT	Vehicle Hours of Travel
VMT	Vehicle Miles of Travel

APPENDIX F: AGENCY CORRESPONDENCE: CONSULTATION LETTERS

Notice of Intent/Notice of Preparation Responses

Consultation Letters

MARCH 3, 1849

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825

1-1-96-I-889

May 2, 1996

Ms. Marie Pang
Environmental Manager
Peninsula Corridor Joint Powers Board
P.O. Box 3006
San Carlos, California 94070-1306

Subject: Proposed Extension of Peninsula Commute Service (CalTrain), San Francisco, San Francisco County, California

Dear Ms. Pang:

The U. S. Fish and Wildlife Service (Service) has reviewed the material submitted with your letter of April 23, 1996, with regard to the effects of the subject project on endangered species of wildlife and plants. No adverse effects on endangered species or their habitats are expected from the proposed activity, nor do the plans offer any practicable opportunity to restore or improve such resources.

Therefore, the Service has no objections, from the standpoint of endangered species, to the subject proposal of extension of the Peninsula Commute Service. This conclusion applies only to our Endangered Species Program concerns.

Please contact Michael Thabault of my staff at (916) 979-2725, if you have questions regarding this response.

Sincerely,

Joel A Medlin

Joel A. Medlin
Field Supervisor

cc: ARD, Klamath and California Ecoregions, Region 1, Portland, Oregon

① [illegible]
② [illegible]

CALTRAIN

Peninsula Corridor Joint Powers Board
1250 San Carlos Ave., P.O. Box 3006, San Carlos, CA 94070-1306
(415) 508-6269 fax (415) 508-6281

April 23, 1996

Mr. Joel A. Medlin
Fish and Wildlife Service
United States Department of Interior
Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, CA 95825-1846

RECEIVED
APR 2 1996
De Leuw, Cather & Company
SAN FRANCISCO, CALIF.

Attention: Section 7 Office Assistant

Subject: Species List for Proposed Extension of Peninsula Commute Service (CalTrain), San Francisco, San Francisco County, California

Dear Mr. Medlin:

JPB's consultants, De Leuw, Cather & Company, received the Service's response to their April 10 request for a listing of Threatened, Endangered and Candidate Species for the area potentially affected by the Joint Powers' Board proposed extension of CalTrain service from its current terminus at Fourth and Townsend Streets to the Transbay Terminal in San Francisco. We appreciate your very prompt reply.

The listing appears to include all species that may be affected by projects within the whole of both USGS Quads comprising San Francisco, most if not all of which are not relevant to our project area. De Leuw, Cather's Pat Gelb discussed this with Mike Thabault of your staff, and I am therefore writing to further clarify the context for our proposed project.

Our project area (as shown in the enclosed map) is limited to urbanized area between about Mariposa and Third Streets on the south and Folsom and Spear Streets on the northeast. This area is nearly all paved with concrete and asphalt. The only vegetation is landscaping in South Park and the developing South Beach residential area. No natural habitat for biological plant, animal or bird species remains. Although the project is in the vicinity of San Francisco Bay, actual project construction would be some 1000 feet from the Bay and none of the alternative options would require filling of wetlands or have any effect on wetlands or water quality. None of the project alternatives involves construction on or immediately adjacent to the Bay Bridge, so no effects on San Francisco Bay bird species are anticipated.

These findings are consistent with the previous environmental study conducted in this area, the City of San Francisco's Embarcadero Freeway and Terminal Separator Structure Replacement EIS/EIR, (1995) which lies in much of the same portion of San Francisco's South of Market area as the present project. It should be noted that in response to the City of San Francisco's request for a listing of special status species for that study, the Service replied (1-1-92-SP-1327) that there were no listed or proposed species.

Based upon the information presented above, we request your concurrence that there are no listed, proposed, or candidate species within the study area of the proposed CalTrain extension project. I am including another copy of our project area map and project description for your convenience. Thank you.

Sincerely,

Marie Pang

Marie Pang
Environmental Manager

Enclosure
cc: Pat Gelb, DCCO

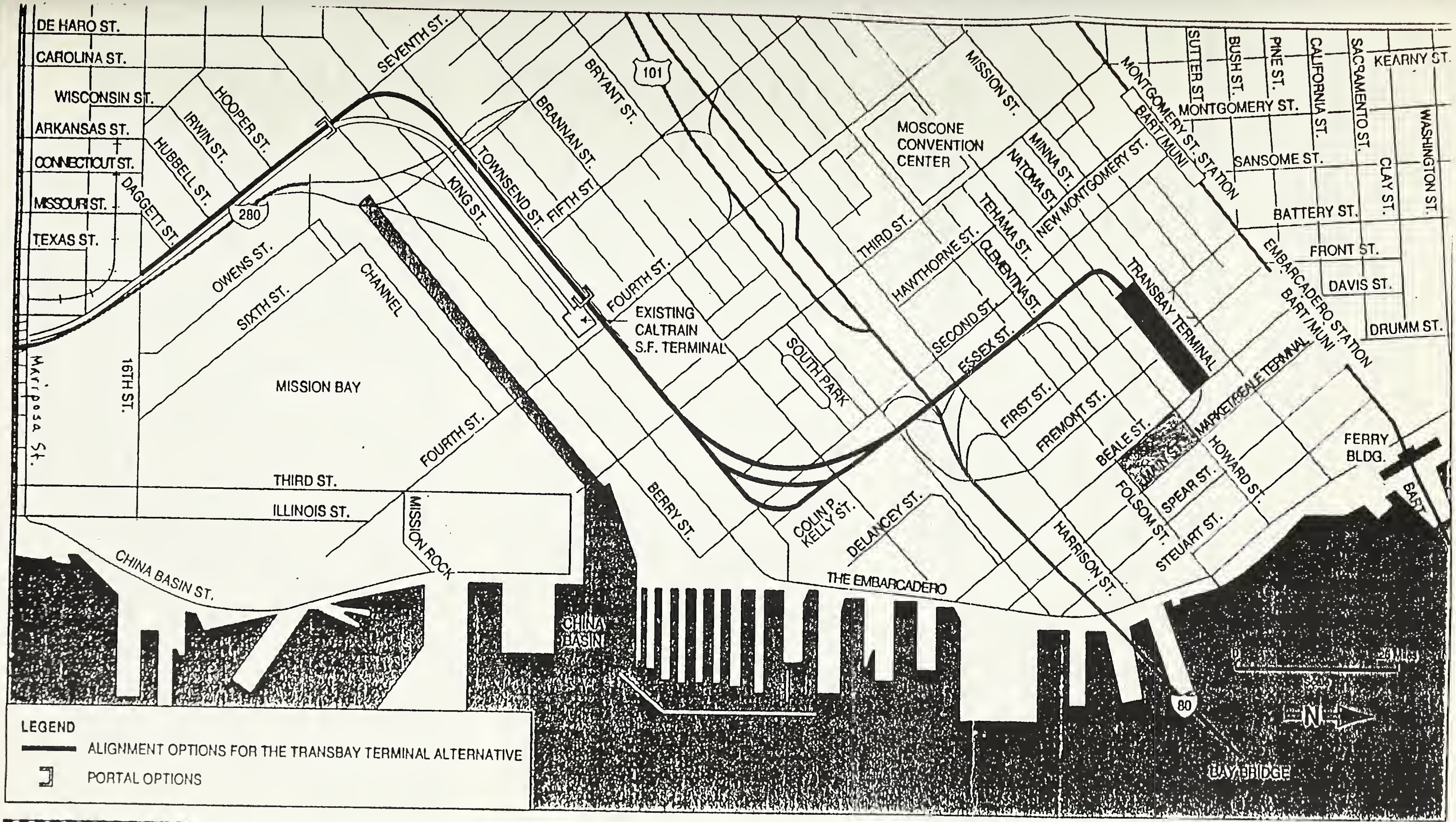
DE HARO ST.
CAROLINA ST.
WISCONSIN ST.
ARKANSAS ST.
CONNECTICUT ST.
MISSOURI ST.
TEXAS ST.
DAGGETT ST.
HUBBELL ST.
IRWIN ST.
HOOPER ST.
280
OWENS ST.
SIXTH ST.
16TH ST.
Mariposa St.
MISSION BAY
CHANNEL
THIRD ST.
ILLINOIS ST.
FOURTH ST.
MISSION ROCK
CHINA BASIN ST.
CHINA BASIN
SEVENTH ST.
KING ST.
TOWNSEND ST.
FIFTH ST.
BRANNAN ST.
BRYANT ST.
101
FOURTH ST.
EXISTING CALTRAIN S.F. TERMINAL
BERRY ST.
SOUTH PARK
COLIN P. KELLY ST.
DELANCEY ST.
THE EMBARCADERO
THIRD ST.
HAWTHORNE ST.
SECOND ST.
CLEMENTINA ST.
ESSEX ST.
TEHAMA ST.
NATOMA ST.
MINNA ST.
MISSION ST.
MOSCONE CONVENTION CENTER
NEW MONTGOMERY ST.
FIRST ST.
FREMONT ST.
BEALE ST.
MAIN ST.
HARRISON ST.
FOLSOM ST.
SPEAR ST.
STEUART ST.
HOWARD ST.
MARKET/BEALE TERMINAL
TRANSBAY TERMINAL
MONTGOMERY ST. STATION BART/MUNI
EMBARCADERO STATION BART/MUNI
SUTTER ST.
BUSH ST.
PINE ST.
CALIFORNIA ST.
SACRAMENTO ST.
KEARNY ST.
WASHINGTON ST.
CLAY ST.
MONTGOMERY ST.
SANSOME ST.
BATTERY ST.
FRONT ST.
DAVIS ST.
DRUMM ST.
FERRY BLDG.
BART
80
BAY BRIDGE
N
LEGEND
ALIGNMENT OPTIONS FOR THE TRANSBAY TERMINAL ALTERNATIVE
PORTAL OPTIONS

FIGURE 2-5
TRANSBAY TERMINAL SITE ALTERNATIVE
ALIGNMENT OPTIONS

CALTRAIN SAN FRANCISCO
DOWNTOWN EXTENSION PROJECT

CalTrain Downtown Extension Project

The Joint Powers Board (JPB) in cooperation with the Federal Transit Administration (FTA) proposes to extend its Peninsula Commute Service (CalTrain) from its current terminus at Fourth and Townsend Streets to the site of the existing Transbay Transit Terminal at Mission, First, Howard and Fremont Streets in the City of San Francisco, a distance of about 0.85 mile. Alignment options follow Townsend Street to Colin P. Kelly/Essex Street, with alternate tunneling alignments for rounding the corner of Townsend/Colin P. Kelly.

Replacement options for the existing Transbay Terminal include the present site and an alternative site at Main, Howard, Beale and Folsom Streets, and surface street bus operations. Midday bus storage options within the area from about Mariposa and Third Streets on the south and Folsom and Spear Streets on the northeast are also under consideration. The project area and alternatives are depicted on the enclosed map. A DEIS/DEIR is being prepared on the basis of preliminary engineering for this project.

STATE OF CALIFORNIA — THE RESOURCES AGENCY PETE WILSON, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO 94296-0001
(916) 653-6624
FAX: (916) 653-9824

October 2, 1996

FTA960729A

Leslie T. Rogers, Regional Administrator
Federal Transit Administration
Region 9
201 Mission Street, Suite 2210
SAN FRANCISCO CA 94105

Re: CalTrain San Francisco Downtown Extension Project, San Francisco, San Francisco County.

Dear Ms. Rogers:

Thank you for submitting to our office your July 26, 1996 letter and Historic Property Survey Report (HPSR) for the Caltrain San Francisco, San Francisco County. The proposed project will extend CalTrain rail service from its present northern terminus at Fourth and Townsend streets to a downtown station at the site of the present Transbay Terminal, a distance of approximately 1.1 miles. The project is expected to improve access to downtown San Francisco and enhance regional transit connectivity to other transit services in the area. It is also expected to serve the growing demands on the San Francisco-San Jose corridor and alleviate traffic congestion on local freeways. The aforementioned project description is one of two alternatives being considered by the Peninsula Commute Service Joint Powers Board (JPB). The other alternative is a No-Build alternative that seeks to work with existing services and facilities in the corridor.

You are seeking our comments on your determination of the eligibility for 207 properties located within the project Area of Potential Effects (APE), and evaluated in the HPSR, for inclusion on the National Register of Historic Places (NRHP) in accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. Of the 207 structures evaluated in the HSPR, 105 were previously evaluated in earlier studies. Six of the properties are listed on the NRHP, 40 were determined, by consensus, to be eligible for inclusion on the NRHP, and 59 were determined ineligible for the NRHP. Those 99 properties that were determined eligible or ineligible were re-evaluated for this project. Of these properties, you have determined that three properties previously determined ineligible are now eligible based on new information. You have also determined that four properties previously determined to be eligible are now ineligible based on new information. The previously determined eligible, but now considered ineligible are:

- 333-352 Bryant Street

- 385 Bryant Street
- 55-77 Federal Street
- 549-551 Mission Street

Based on the new information provided in the submitted HPSR, we concur with your determination that the aforementioned five properties are now ineligible for inclusion for the NRHP. All of the properties have undergone alterations or changes to their original designs and materials that have resulted in a considerable loss of the integrity associated with their historical periods of significance.

Regarding those properties previously determined ineligible but now considered eligible, we concur with the following determinations, based on new information provided in the HSPR:

- 401 Howard Street is now eligible for inclusion on the NRHP under Criterion A and C as defined in 36 CFR 60.4. The structure has strong associations with the H.N. Cook Belting Company, a manufacturer of belts for early industrial machines and motors. The building is also retains the integrity of design associated with the City Beautiful Movement as applied to industrial structures of its day.

- 72 Tehama Street is now eligible for inclusion on the NRHP under Criterion A and C. The structure has strong associations with the development of San Francisco's early sheet metal industry and is one of only three structures remaining in the city with associations to this industry. It has retained integrity of design and materials associated with its historic period of significance.

- 235-247 Second Street is still ineligible for inclusion on the NRHP under any of the criteria defined by 36 CFR 60.4. No conclusive evidence in the HPSR points to strong associations with historically significant events or persons. No evidence provided to show the significance of the Mark Lally Company in the development of the plumbing industry in San Francisco in either a wholesale, retail, or commercial construction context. The structure also is not an outstanding example of its type in the overall context of San Francisco's architectural heritage.

A total of 102 have been evaluated for the first time in this survey. You are seeking our comments on your determination of the eligibility of these structures for inclusion on the NRHP in accordance with Part 800. Our review of the submitted HPSR leads to make the following comments:

We concur with your determination that 350-360 Townsend Street, 690-698 Fourth Street, 685 Sixth Street, 700-768 Seventh Street, and 76-80 First Street are all eligible for inclusion on the NRHP under Criterion A and C as defined by 36 CFR 60.4. All of the structures have strong associations with historic events and persons and are architecturally significant. None of the remaining 54 pre-1951 structures evaluated in the HPSR are eligible for inclusion on the NRHP under any of the criteria established by aforementioned criteria. We have noted, however, that further studies may be conducted for 151-156 Townsend Street, 553-555 Howard Street, and 218 Fremont Street to determine if they will eventually meet National Register criteria. We acknowledge the fact that none of the 48 post-1951 properties should be considered for eligibility for the NRHP at this time because they meet neither the National Register age criteria nor the criteria for exceptional significance as defined under Criteria Consideration G. As such, it will be noted that the structures were included in the HPSR, but will not be added to our historic resources inventory at this time.

Regarding your proposed archeological monitoring and testing programs, we have the following comments:

- o We find that the submitted historical overview is adequate in its scope.
- o The recommendation for testing for eligibility is good. However, a more involved context statement/research design is needed for a discovery plan (as defined in 36 CFR 800.11) for those properties where monitoring is recommended.
- o If it later develops that testing is not possible, then a Programmatic Agreement with a context statement/research design and the manner of its implementation would be needed.

Thank you for seeking our comments on your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Original Signed by
Cherilyn Widell
State Historic Preservation Officer

cc: Vincent Marsh, S.F. City Planning

APPENDIX G: ARCHITECTURAL RESOURCES IN THE AREA OF POTENTIAL EFFECT SHOWING NATIONAL REGISTER STATUS, CALIFORNIA REGISTER STATUS, LOCAL DESIGNATIONS, AND SURVEY RATINGS

APPENDIX G
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
230-40 Brannan Street	H.S. Crocker Co. (1907)	3774/25	3D (I-280)		SFHD-C		B*	2
274 Brannan Street	Hawley Terminal (1923)	3774/27	3D (I-280)		SFHD-C	SOM	C**	
275 Brannan Street	Rosenberg Bros. Dried Fruit Warehouse (1904)	3789/9	1S/3D (I-280)	Yes	SFHD-C	SOM	B	
301-21 Brannan Street	Crane Co. Building (1906)	3788/37	3D (I-280)		SFHD-C		B*	
333-53 Bryant Street	Ondawa Building (1920)	3774/8	6 (CT)		SFHD-C, ALT	SOM	C**	
355-61 Bryant Street	G.E. Warehouse (1907)	3774/55	3D (I-280)		SFHD-C	SOM	B	
385 Bryant Street	Schmidt Litho (1924)	3774/54	6 (CT)		SFHD-C, ALT		B	
64 Clementina Street	Haas Woodworking (1920)	3736/60	3S (Emb)				C	
69 Clementina Street	(1920)	3736/36					C	
70 Clementina Street	(1920)	3736/61					D	
52 Colin P. Kelly Street	(1907)		2S2/3D (I-280)					
55-77 Federal Street	American Licorice Co. (1907)		6 (CT)					
58-60 Federal Street	(1910)	3774/12	6 (I-280)		SFHD-C, ALT		D	
85 Federal Street	(1950)	3774/66	6 (I-280)		SFHD-NC			
530-34 Folsom Street	Caswell Coffee (1907)	3736/17					B	
572-78 Folsom Street	Bier Building (1912)	3736/25					B	
580-90 Folsom Street	Bothin Building (1921)	3736/27					C	
101-29 Fremont Street		3719/17					D	
177-81 Fremont Street	(1908)	3719/11	4S (I-280)				C	
193 Fremont Street	(1906)	3719/9	6 (I-280)				D	
215 Fremont Street	Butler Buildimg (1928)	3738/2	6 (I-280)				C	

APPENDIX G (Cont.)
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
218 Fremont Street	Philadelphia Storage Battery (1929)	3737/2					C	
224 Fremont Street	Van Emon Elevators (1908)	3737/3					C	
236 Fremont Street	(1940)	3737/3					C	
244 Fremont Street	(1913)	3737/4					C	
100-50 Hooper Street	Greyhound Sheds (1928)	3808/1					C**	
342-56 Howard Street	Marine Electric Co. (1907)	3719/8	3S (I-280)		Cat III		B	
401 Howard Street	Cook Belting (1917)	3737/1	3S (CT)				C	
407 Howard Street	Thomson Machine (1918)	3737/1B	6 (I-280)				C	
500-16 Howard Street	Printing Arts (1922)	3721/11	4S (I-280)				B	
501-07 Howard Street	Joseph Black Warehouse (1906)	3736/1	6 (I-280)				C**	
525 Howard Street	L. Lurie Building (1921)	3736/114	6 (I-280)				C	
527-29 Howard Street	Martin Building (1906)	3736/83	3S (I-280/Emb)				C	
530-32 Howard Street	Bothin Building (1908)	3721/14	6 (I-280)				C	
531-33 Howard Street	Mercedes Building (1906)	3736/112	3S (I-280/Emb)				C	
540 Howard Street	Federal Security (1908)	3721/16	6 (I-280)				C	
543 Howard Street	Calif. School of Mechanical Arts (1923)	3736/111	6 (I-280)				C	
547-49 Howard Street	Greely Building (1907)	3736/110	6 (I-280)				C**	
553-55 Howard Street	Kahn Warehouse (1911)	3736/86	6 (I-280)				C	
557 Howard Street	(1922)	3736/107	6 (I-280)				C	
571 Howard Street	(1924)	3736/102					C	

APPENDIX G (Cont.)
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
562-64 Howard Street	(1907)	3721/19					C	
568-76 Howard Street	Jannsen Building (1905)	3721/20					B	
577-79 Howard Street	Taylor Building (1907	3736/100					C	
45-57 Lusk Street	(1922)	3787/19					C	
Market Street	Path of Gold Lights		3S (Emb)		L#200			
245 Market Street	PG&E Building (1925)	3711/14A	1S (SHPO)	Yes	Cat I		A	
301-15 Mission Street	W. P. Fuller Building (1907)	3719/1					B	
334-60 Mission Street	Gebrian Building (1923)	3710/17					D	
425 Mission Street	Transbay Terminal & Ramps (1939)	3720/1	2S1 (SHPO)	Yes			B	
440-54 Mission Street	Terminal Plaza Building (1920)	3709/8	3S (SHPO)				C**	
500-06 Mission Street	Brandenstein Building (1907)	3708/9					C	
531-33 Mission Street	Kinney Building (1908)	3721/83					D	
545-47 Mission Street	Greenwood Building (1906)	3721/82					C	
549-51 Mission Street	Allyne Building (1913)	3721/81	6 (CT)				C	
553 Mission Street	McCartney Building (1906)	3721/80					C	
557-63 Mission Street	(1908)	3721/79					D	
565-67 Mission Street	Neppert Building (1907)	3721/78					C	
35-37 Natoma Street	McElroy Building (1912)	3721/88	6 (I-280)				C	
39 Natoma Street	Bothin Building (1922)	3721/35	6 (I-280)				C	

APPENDIX G (Cont.)
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
77-79 Natoma Street	Oppel Building (1914)	3721/29					C**	
81 Natoma Street	(1924)	3721/28					C	
83 Natoma Street	(1925)	3721/27A					C	
Rincon Street	Rincon Hill Site			Yes (CHL#84)				
19 Tehama Street	(1906)	3736/78					C	
72 Tehama Street	Brizard & Young (1906)	3736/91	3S (CT)		Cat III		B	
74 Tehama Street	(1906)	3736/92					C	
78-80 Tehama Street	(1908)	3736/93					C**	
90 Tehama Street	(1928)	3736/94					C	
64-72 Townsend Street	Hoopers South End Warehouse (1874)	3789/3	2S2 (I-280)	Yes	SFHD-C		B	
101-09 Townsend Street (710 Second Street)	Mercado Latino (1913)	3794/15	3D (I-280)		SFHD-C	SOM	C	
111-13 Townsend Street	Rohr Building (1911)	3794/14	3D (I-280)		SFHD-C	SOM	C	
115-31 Townsend Street (126 King Street)	S.P. Warehouse (1903)	3794/10	1S/3D (I-280/Emb)		SFHD-C	SOM	A	
130 Townsend Street	Zytron (1905)	3788/8	3D (I-280)		SFHD-C, ALT		B	
135 Townsend Street	Stevenson & Son (1911)	3794/22	3D (I-280)		SFHD-C	SOM	B	
136 Townsend Street	(1913)	3788/9	3D (I-280)		SFHD-C	SOM	C	
139 Townsend Street	Haslett Warehouse (1909)	3794/21	3D (I-280)		SFHD-C, ALT	SOM	C**	
144-46 Townsend Street	L.A. Norris Co. (1922)	3788/9A	3D (I-280)		SFHD-C	SOM	C	
148-54 Townsend Street	Winchester Simmons Co. (1922)	3788/10	3D (I-280)		SFHD-C	SOM	C	

APPENDIX G (Cont.)
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
162-64 Townsend Street	L.A. NorrisCo. (1919)	3788/11A	3D (I-280)		SFHD-C		C	
166-78 Townsend Street	CA Electric Light Company (1888)	3788/12	3D (I-280)		SFHD-C	SOM	A	
180 Townsend Street	CA Wine Association (1906)	3788/13	3D (I-280)		SFHD-C	SOM	B*	
200-02 Townsend Street	Williamson Building (1913)	3787/11			SFHD-C			
224 Townsend Street	Wagreich Warehouse (1935)	3787/13					C	1
310 Townsend Street	Crocker Warehouse (1901)	3786/13				SOM	B*	3
350-60 Townsend Street	W.P Fuller & Co. (1906)	3786/15	3S (CT)			SOM	B	
410 Townsend Street	Nathan Dohrman Building (1912)	3785/2A				SOM	C**	
76-80 First Street	Marwedel Building (1908)	3708/7	3S (CT)				C	
82-84 First Street	(1908)	3708/8					C	
167-99 First St.reet (408 Howard Street)	Bickford Printing Machine (1918)	3720/7	6 (I-280)				C	
206-12 First Street	(1935)	3736/3A					C	
220-28 First Street	(1920)	3736/4					C	
231-35 First Street	Van Emon Elevators (1913)	3737/23	3S (Emb)		Cat I		B	
234-46 First Street	Phillips & Van Orden Building (1929)	3736/6	3S (Emb)		Cat I		A	
237 First Street	(1913)	3737/22					C	
235-37 Second Street	Mark Lally Co. (1912)		3S (CT)					

APPENDIX G (Cont.)
Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
461-67 Second Street	Schmidt Litho (1907/19)	3764/9, 10	3D (SHPO)					
599 Second Street	L.A. Scoop Company (1923)	3774/31	3D (I-280)		SFHD-C	SOM	C	
601-15 Second Street	Felton Co./Haslett Wharehouse (1909)	3789/8	3D (I-280)		SFHD-C	SOM	B	
625-35 Second Street	South End Warehouse (1905)	3789/7	1S/3D (I-280)	Yes	SFHD-C	SOM	C**	
634 Second Street	Crane Co. (1926)	3788/38	3D (I-280)		SFHD-C	SOM	C	
640 Second Street	(1925)	3788/2	3D (I-280)		SFHD-C	SOM	C	
650 Second Street	B.F. Goodrich Rubber Co. (1922)	3788/2A	3D (I-280)		SFHD-C	SOM	C**	
670-80 Second Street	Moore & Scott Iron Works (1913)	3788/43, 44	3D (I-280)		SFHD-C	SOM	C**	
698 Second Street	SFFD Pump Station (1910)	3788/6	1S/3D (I-280)	Yes	SFHD-C	SOM	B*	
675-99 Second Street	California Warehouse (1882/1911)	3789/4	1S/3D (I-280)	Yes	SFHD-C	SOM	B*	
685-89 Third Street	MJB Warehouse (1906)	3788/15	3D (I-280)		SFHD-C	SOM	C**	
691-97 Third Street	Davidow Building (1917)	3788/14			SFHD-NC		D	
690-98 Fourth Street	American Radiator (1926)	3786/9	3S (CT)				C**	0
685 Sixth Street	Holbrook, Merrill & Stetson (1920)	3785/5					C	
700-68 Seventh Street	Pacific Hardware & Steel Co. (1904)	3799/1	3S (CT)		L#193		A	
830 Seventh Street	S.F. Milling Company (1927)	3800/2					C	

APPENDIX G (Cont.)

Architectureal Resources in the Area of Potential Effect
Showing National Register Status, California Register Status, Local Designations, and Survey Ratings

Street Address	Building Name and Date (if any/if known)	Parcel No.	National Register Status (Source)	California Register	SF Planning Code Article 10 & 11	SF General Plan	Heritage Survey	1976 DCP Survey
1300 Seventh Street	Main Iron Works (1910)	3833/1					C**	
1400 Seventh Street	(1923)	3834/1					C	
Rincon Point/ South Beach (South End) Historic Deistrict			3D (SHPO)		SFHD			
New Montgomery-Second Street Conservation District			6 (SHPO)		Article 11			
Bay Bridge and Associated Ramps			2S1 (SHPO)	Yes				

KEY:

National Register Status:

1S	Listed
2S1	Determined Eligible
2S2	Determined Eligible
3D	Appears Eligible as Part of a District
3S	Appears Eligible
6	Ineligible

California Register:

Yes	Listed
CHL#	CA Historic Landmark

SF General Plan:

SOM	Identified in the South of Market Plan

SF Planning Code:

SFHD-C	Contributes to Local District
SFHD-NC	Non-Contributing Structure
SFHC-C, ALT	Contributory, Altered Structure
L#	Designated Landmark
Cat I	Significant (under Article 11)
Cat II	Significant (under Article 11)
Cat III	Significant (under Article 11)

Heritage Survey:

A	Highest Importance
B	Major Importance
C	Contextual Importance
D	Not Significat
*	w/alterations
**	w/potential for upgrade

1976 DCP Survey: Range from 1 to 5, with 1 being buildings with the high architectural merit

2